

Confidence

# **DT Logger Host Instruction Manual PC Platform**

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## **1** OVERVIEW

The RST Single Channel and Multi Channel Dataloggers were intended to be low cost, simple to use, battery powered data loggers, designed for reliable, unattended monitoring of a mix of vibrating wire sensors and thermistors. They are deployable in harsh environments and as compact as possible. The user-friendly software allows easy downloading of the data and maintenance in the field. Even users with very little experience with Geotechnical Instruments will be able to connect, download data and change settings with a matter of a few inputs.

DT Logger Host software is compatible with the following RST Instruments data loggers:

- DT2011 (discontinued, replaced by DT2011B)
- DT2011B (single channel logger, vibrating wire and thermistor)
- DT2055 (discontinued, replaced by DT2055B)
- DT2055B (10 channel logger, vibrating wire and thermistor)
- DT2040 (40 channel logger, vibrating wire and thermistor)
- IC6560 (uniaxial tilt logger)
- IC6660 (biaxial tilt logger)
- DTL201B-2B (uniaxial and biaxial tilt logger)
- MTCM (discontinued, mine tunnel convergence monitor and logger)
- DT4205 (10 channel logger, 4 to 20mA and thermistor)
- DT2306 (18 channel potentiometer logger)
- DT2485 DT-BUS logger
- DT2033 Wireless Downhole logger
- DT2350 Strain logger
- GAA2820 Slope Monitoring System
- DTSAA Shape Array Logger

Supported loggers are shown below for a reference.





Figure 1-1 – Supported data loggers



## 2 HOST SYSTEM REQUIREMENTS

## 2.1 PC HARDWARE

- Desktop or laptop with Intel or AMD processor.
- USB port.

## 2.2 WINDOWS HOST OPERATING SYSTEM

The following Microsoft<sup>™</sup> Windows operating systems are supported:

- Windows 7 (x86 and x64)
- Windows Server 2008 R2 (x64)
- Windows 8 (x64)
- Windows Server 2012 R2 (x64)
- Windows 8.1 (x64)
- Windows 10 (x86 and x64)

## **3 QUICK-START INSTRUCTIONS**

The following is a brief outline with references to other parts of this manual to get you up and running quickly with the RST Data loggers:

## 3.1 SOFTWARE INSTALLATION

- Run the software installation file RST\_DTLogger\_Setup\_X.XX.X.exe, where X.XX.X indicates current software version Current version can be downloaded from: <u>https://rstinstruments.com/resources/software</u>. Navigate to the site and select the appropriate data logger.
- 2. Follow the on-screen instructions to install the software. The default directory is: C:\Program Files (x86)\RST Instruments\DT Logger Host\

NOTE: The DT Logger Host software requires a set of drivers installed on the host computer in order to communicate over USB communication port. If automatic driver update is enabled, and an internet connection available, RST USB drivers will be downloaded from Microsoft<sup>™</sup> Windows Update server and

Contact RST Instruments with any questions or concerns.



## 3.2 DT2011B, DT2055, DT2055B, AND DT2040 VIBRATING WIRE AND THERMISTOR DATALOGGER SETUP

- 1. Remove the cover of the data logger by the four Phillips screws.
- 2. Insert the stripped ends of the cable for the VW Transducer or thermistor sensor through the cable gland and attach them to the terminal strip as shown below.



Terminal ID	Wire Colour
1A	Red
1B	Black
SH	Bare (shield)
2A	Green
2B	White

\*See Section 8 for more information about batteries.

## Figure 3-1 – VW and TH sensor connections

3. Using the supplied USB cable, connect the data logger to your computer's USB port. Follow the steps in Section 10 to install USB Controller drivers. Click the logger image to change to Multi Channel logger mode.

## 3.3 IC6560, IC6660, DTL201B, AND DTL202B TILT LOGGER SETUP

Tilt Logger contains internal MEMS tilt sensors; therefore, there is no need for external wiring. Click tilt logger image to change to tilt logger mode.

## 3.4 DT4205 4-20MA LOGGER SETUP

Follow the same steps as in Section 3.2.

The DT4205 is designed to work with loop-powered (2 wire) 4-20 mA transmitters and NTC thermistors in any mix. Thermistors are non-polarized, but 4-20 mA transmitters typically require correct connection polarity. Refer to Figure 3-2.







## 3.5 DT2306 POTENTIOMETER LOGGER SETUP



\*See Section 8 for more information about batteries

## Figure 3-3 – DT2306 sensor connections

## 3.6 DT2485 AND DT2033 DT-BUS DATALOGGER SETUP

- 1. Remove the cover of the data logger by the four Phillips screws.
- 2. Insert the stripped ends of the cable for the RS485 bus through the cable gland and attach them to the terminal strip. Where:



Terminal ID	Wire Colour	Alternative Wire Colour
SH	Bare (shield)	Bare (shield)
7V	Red	Brown
GND	Black	White
В	White	Black
А	Green	Blue

### Table 3-1 – Wiring colours for DT-BUS datalogger

## 3.7 DTSAA SHAPEARRAY LOGGER

- 1. Loosen the four Phillips screws to remove the cover of the data logger.
- 2. Insert the stripped ends of the ShapeArray cable through the cable gland and clamp them into the terminal block following the wiring colours described on the terminal block label (Table 3-2):

Terminal ID	Wire Colour
WHT	White
BLU	Blue
BLK	Black
RED	Red
SH	Bare (Shield)

Table 3-2 – Wiring colours for DTSAA

- 3. Tighten the cable gland according to the installation guide.
- 4. Replace the lid and use the four Phillips screws to secure in place.

## 3.8 DT2350 STRAIN GAUGE DATALOGGER SETUP

- 1. Remove the cover of the data logger by the four Phillips screws.
- 2. Insert the stripped ends of the cable for the loadcell through the cable gland and connect to logger plugs as shown on following diagram.



**NOTE:** When connecting 4-wire sensors, ignore PS+ and PS- terminals.





\*See Section 8 for more information about batteries

## Figure 3-4 – DT2350 sensor connections

## 3.9 **DATALOGGER CONFIGURATION**

- 1. Launch the software. Once connected, the port and status indicators turn green and the *Status* screen should display logger information. See Section 9 for connection troubleshooting.
- 2. Navigate to the *Sensors* tab and setup all attached sensors parameters. Once the desired parameters are set, press the *Upload to Logger* button to apply the changes and start logging.
- 3. If you wish to record the data in specific Engineering Units, enable the *Eng Units* and enter the appropriate parameters and press the *Upload to Logger* button to update the logger.
- 4. Go to Logging tab and check that logging parameters are correct and change them if necessary. If changes were made, Press the *Apply Settings* button to apply settings and restart logging.
- 5. If desired, live sensor reading can be monitored in real time by selecting the *Monitor* tab.
- 6. Under the *Status* tab, check to make sure the parameters are correct, and that the logger is either *logging* or there is a *log pending*.
- 7. Click Disconnect button to terminate logger connection.
- 8. Exit the software and disconnect the communication cable.
- 9. The data logger should now be taking readings. Return when desired to download the data. Make the habit of checking the battery remaining life every time you connect. The battery state is an approximate value based on recent battery use.



## 3.10 DOWNLOADING DATA

- 1. Connect the communication cable to your computer and the data logger and launch the software. If the connection is successful, the port and status indicators turn green and the *Status* screen should display logger information.
- 2. Press the *Collect Data* button to download the data. A data file (\*.csv) will automatically be created in the data directory. The default data directory is: **My Documents\Multichannel\**
- 3. Before downloading, the program will prompt you whether you would like to erase the existing data on the logger or keep appending to existing records. Alternatively, if you wish to erase the old data and continue logging with the same parameters, select the *Logging* tab and press *Apply Settings*.
- 4. If you wish to keep the old data on the logger and continue logging, exit the program and disconnect the communication cable.
- 5. If you wish to change any logging parameters, do so under the *Logging* tab and press *Apply Settings* to save the changes.
- 6. Disconnect the communication cable when finished.

## 3.11 Help System

Extensive help system can be activated anytime by pressing F1 or help icon. Answers to common problems and troubleshooting tips can be found by browsing help topics or searching using keywords.

## **4** DATALOGGER CONNECTION

Single and multichannel loggers can be connected using communication cable or optional wireless module.

The Connections tab enables the user to change logger settings and access advanced features

#### CSV Data File Folder

The location of \*.csv file data folder can be changed using *Data File Folder* dialog box. Press *Browse*... to change or create new folder. By default, data files are saved to: **My Documents\Multichannel\** 

Options button list expands to show following entries:

#### Logger Options

Monitor Mode (DT2040 only)

Two monitor modes are made available for large channel number logger (DT2040). Sequential (standard mode) displays 10 consecutive channel monitor data. Pick mode allows selecting up to 10 channels from active sensor pool.

#### Advanced Options

The DT Logger Host software includes special features for advanced troubleshooting and data retrieval. They are to be used with assistance of RST Instruments technical staff in case of corrupted data.

#### Default Settings

Restores default logger settings.

#### Change Admin Password

The option is given to protect Logging and Sensor settings with user defined password.



Please memorize or store password in safe place. If Admin password is forgotten, call RST Support.

#### Other Options for all logger types

Fahrenheit temperature units setting causes all temperatures displayed and saved in Fahrenheit temperature scale.

#### Wireless Settings

RSTAR Array Radio Series system configuration settings. For further information on RSTAR settings, see Section 7.

DT Link remote logger access. Please refer to section 7.2 for advanced DT Link settings explanation.

#### Software Update Check

Click *Check now* to find out if software update is available for automatic download and installation. To change online update options, click *Update Options*.

## 4.1 WIRED CONNECTION

All loggers can be connected to the host computer using USB cable.



### Figure 4-1 – Connections tab – wired

Wireless button will show settings dialogs for changing various wireless settings.

## 4.2 WIRELESS CONNECTION USING RST DT LINK MODULE

With optional wireless module installed and configured, a host computer connected to the DT Link HUB will have wireless access to the user selected loggers.



CSV Data file	Folder					_		Contraction of the	
C:\Users\W	/in7Pto\Docum	nents\Multic	channel			Browse	▼ Options		
Dpen j	Eolder 9	Wirele: Setting	25 pi					A.	TRANSFORM
Wireless Log	per List					Move	$\vee$ $\land$	ET.	- Alina
N/F	Туре	Serial	Download Time		Label	10	Rec N *	000	10:
	DT2011B	100			133		1	1	a state of the second
	DT2011B	14890		Single Channe	el VW Logger DT	20118			
	DT2011B	14888		Single Channe	el VW Logger DT	20118		-	
	DT2011B	14887		Single Channe	el VW Logger DT	20118		-Jak	
	DT2485	12345	2018/09/04,17:25:14	IPI L	ogger DT2485			5.	- 45
	TILTLB	1294	2018/10/12,10:32:15	Upper	Wall - South End			100	
	TILTLB	1193	2018/11/01.12:44:12	Tilt Log	iger DTL2018/28			- Aller	
< [	THEFT		11		D TI SOUR IS		•	11	
▼ Modify Lis	at 1		Append Data Overwrite	Download	Connect	PDiscow	N Stop	Custom	0.4
					Disconnect	🔫 Ping Sel			l⇔ ∎
		_						9	Deconnect
	Datus Massaci		Connected to com	anto hudo	0.0	00		- Connect	to selected dev

Figure 4-2 – Connections tab – wireless DT Link



**NOTE:** When "Connect to selected device only" is enabled, the software will connect to the logger selected in logger picture list. Any other loggers will be ignored.

#### Wireless Logger List

Logger list can be updated manually using *Modify List* button.

More convenient automatic logger search can be initiated using *Discovery* button. The list entries consist of logger type, logger serial number, data download time, logger label, record number, radio MAC address and network ID. Discovery search indicates found (F) and new (N) loggers. Selected logger entries can be sorted using  $\land$  and  $\lor$  buttons.

#### Ping

To verify logger accessibility, click *Ping Sel* button. The software will try to retrieve basic information from selected logger: Download Time, Record Number, Label and wireless signal strength. Click *Stop* to stop pinging.

#### **Connecting loggers**

Click *Connect* button to establish wireless communication link with selected logger. Upon successful connection, logger status is retrieved, and the software will automatically switch to Status tab. Click *Disconnect* button to disconnect and switch back to wireless logger list.

#### Download

For speedy data download, click *Download* button. The software will connect to selected logger, download all data to a file and disconnect wireless connection. Select Append radio



button to keep historical data or select Overwrite radio button to restart logging after data download.

#### Download All

For automatic data download, click *Download all* button. The software will connect to loggers indicated by check mark, download all data to a file and disconnect wireless connection. Select Append radio button to keep historical data or select Overwrite radio button to restart logging after data download. Click *Cancel* to interrupt download process

#### Wireless Settings

Wireless button will show settings dialogs for changing various wireless settings. Please refer to section 7.2 for advanced DT Link settings explanation.

## 4.3 WIRELESS CONNECTION USING RSTAR SYSTEM

The RSTAR Array Radio Series use wireless technology to provide continuous data acquisition. Please refer to section 7 for RSTAR system details.

### 4.4 **OPTIONS**

#### Logger Options for all logger types

Fahrenheit temperature units setting causes all temperatures displayed and saved in Fahrenheit temperature scale.

#### Monitor Mode (DT2040 only)

Two monitor modes are made available for large channel number logger (DT2040). Sequential (standard mode) displays 10 consecutive channel monitor data. Pick mode allows selecting up to 10 channels from active sensor pool.

#### Use local status cache for USB connections (DT2485 only)

Enabling local status cache will shorten initial logger connection time. When used with high number of sensors, connection time will be reduced significantly.

#### Advanced Options

The DT Logger Host software includes special features for advanced troubleshooting and data retrieval. They are to be used with assistance of RST Instruments technical staff in case of corrupted data. The remaining advanced settings can be adjusted to fit custom situations

Advanced  The advanced features should be used only with the assistance of RST Instruments Ltd technical personnel.  Special Operations  Memory dump Battery Type Initialize Battery Software Dump LSH20  Factory Reset Set Battery Type HT Adjustments  Special Options Special Options Special Statistics Event List Sample Rate Reset Interval Sync WW Reading USB Slower Transfer Speed Campbell format datafile W Use Resistance Scaling Sensor Update # 5				
The advanced features should be used only with the assistance of RST Instruments Ltd technical personnel.         Special Operations         Memory dump       Battery Type         Initialize Battery         Software Dump       LSH20         Factory Reset       Set Battery Type         HT       Adjustments         Special Options       Special Statistics         Test for VW before reading       DGSI Hz sensors cal         USB Slower Transfer Speed       Sample Rate         W Reading       Low Battery         VW Reading       Low Battery         W Use Resistance Scaling       Sensor Update #	Advanced			×
Memory dump       Battery Type       Initialize Battery         Software Dump       LSH20       Initialize Battery         Factory Reset       Set Battery Type       HT         Adjustments       Special Options       Special Statistics         Test for VW before reading       DGSI Hz sensors cal       Event List         USB Slower Transfer Speed       Campbell format datafile       VW Reading         V Use Resistance Scaling       Sensor Update #       5	The advanced features sho Instruments Ltd technical pe Special Operations	uld be use ersonnel.	ed only with	the assistance of RST
Sottware Dump       LSH20         Factory Reset       Set Battery Type         HT       Adjustments         Special Options       Special Statistics         Test for VW before reading       Event List         DGS1 Hz sensors cal       Sample Rate Reset         USB Slower Transfer Speed       VW Reading Low Battery         Campbell format datafile       Sensor Update #         Use Resistance Scaling       Sensor Update #	Memory dump	Batter	у Туре	Initialize Battery
Factory Reset     Set Battery Type     HT     Adjustments       Special Options     Special Statistics       Test for VW before reading     Event List       DGSI Hz sensors cal     Sample Rate       USB Slower Transfer Speed     Campbell format datafile       VUse Resistance Scaling     Sensor Update #	Software Dump	LSH20	•	]
Special Options       Special Statistics         Test for VW before reading       Event List         DGSI Hz sensors cal       Sample Rate         USB Slower Transfer Speed       VW Reading         Campbell format datafile       Sample midnight sync          Use Resistance Scaling       Sensor Update #	Factory Reset	Set Bat	tery Type	HT Adjustments
Special Options       Special Statistics         Test for VW before reading       Event List         DGSI Hz sensors cal       Sample Rate Reset         USB Slower Transfer Speed       VW Reading Low Battery Sampbell format datafile         Vuse Resistance Scaling       Sensor Update # 5				
Test for VW before reading       Event List         DGSI Hz sensors cal       Sample Rate Reset Interval Sync         USB Slower Transfer Speed       VW Reading Low Battery Sample I format datafile         Use Resistance Scaling       Sensor Update # 5	Special Options		- Special	Statistics
DGSI Hz sensors cal     Sample Rate     Reset     Interval Sync     USB Slower Transfer Speed     Campbell format datafile     Vuse Resistance Scaling     Sensor Update # 5	Test for VW before real	ading		Eivent List
USB Slower Transfer Speed     UW Reading     Low Battery     Sample midnight sync €▼     Use Resistance Scaling     Sensor Update # 5	DGSI Hz sensors cal			Sample Rate
Campbell format datafile Use Resistance Scaling Sensor Update # 5	USB Slower Transfer S	Speed		/W Reading
✓ Use Resistance Scaling Sensor Update # 5	📃 Campbell format datafi	le		Low Battery Sample midnight sync ( 🔻 🗌
	Use Resistance Scalir	ıg	Ser	sor Update # 5
Save	Save			Exit

Figure 4-3 – Advanced options

- Memory Dump: Download memory image to a file. Used for data recovery.
- Software Dump: Create and submit software snapshot for diagnostic purposes.
- Factory Reset: Reset logger to factory defaults erasing all data and settings.
- Battery Type: When replacing with different battery type, Select battery type from the list and click Set Battery Type.
- *Initialize Battery*: To be used after installing new battery.
- Test for VW before reading: adds additional test for VW sensor connection
- DGSI Hz sensors cal: Changes VW sensors output to Hz. Default output is B units.
- USB Slower Transfer Speed: Throttle USB bandwidth for slower laptops.
- Campbell format datafile: Generate \*.dat file in addition to \*.csv file.
- Use Resistance Scaling: Apply resistance calibration to thermistor readings.
- *Adjustments*: Advanced settings for specific situations.
- *HT*: Logger command shell.

#### Change Admin Password

The option is given to protect Logging and Sensor settings with user defined password. Please memorize or store password in safe place. If Admin password is forgotten, call RST Support.

#### Software Update Check

Click *Check now* to find out if software update is available for automatic download and installation. To change online update options, click *Update Options*.

#### 4.4.1 ADJUSTMENTS

The Adjustment dialogs allow fine tuning of various logger parameters. They are to be used with advice from RST Instruments technical personnel. Each setting has a default value specified.



Adjustments		×
General		
		Default
Cmd Char Delay USB (ms)	5	5 ms
Cmd Char Delay DTLink (ms)	0	0 ms
DTLink Retry		3
OK Cancel		

Figure 4-4 – Adjustments – general VW and TH loggers

Adjustments		x
General		
		Default
Cmd Char Delay USB (ms)	5	5 ms
Cmd Char Delay DTLink (ms)	0	0 ms
DTLink Retry		3
Delay Before Scan (s) SAA : 0.1 to 10	0.5	0.5
Read Top Seg Last		
Cancer		

# Figure 4-5 – Adjustments – general DTSAA logger

A	djustments				×
	IPI3 and IPI4 M General	ODBUS 485 Bus IPI 485 Bus	IPI4 A	SCII 485 Bus IPI3 ASCII 4	8 Retry 185 Bus
					Default
	Biaxial SR	Delay (s) 0 to 1	D	0.50	0.5 s
	TR Tries I	Number 0 to 10		0	0
	SR Tries I	Number 1 to 10		3	3
L	ОК	Cancel			

Figure 4-6 – Adjustments – IPI3 ASCII, DT2485 logger



### Figure 4-7 – Adjustments – general DT2485 logger



### Figure 4-8 – Adjustments – IPI4 ASCII, DT2485 logger



Figure 4-9 – Adjustments – 485 bus DT2485 logger





Figure 4-10 – Adjustments – IPI3 and IPI4 Modbus, DT2485 logger

A	djustments					×
	General	IPI 485 Bus		1	IPI3 ASCII 4	85 Bus
ſ	IPI3 and IPI4 M	ODBUS 485 Bus	IP	I4 AS	CII 485 Bus	Retry
	🔽 Enable Sc	an Retry				Default
	Re	170	170			
	Re	1				
	<b>V</b> Auto Stop	o Scan				
	ОК	Cancel				

Figure 4-11 – Adjustments – Scan Retry, DT2485 logger

#### General

Cmd Char Delay USB – delay after each data character in logger to computer USB wired communication.

Cmd Char Delay DT Link – delay after each data character in logger to computer DTLink wireless communication.

DT Link Retry – number of packet retries in wireless DTLink communication, update only value, no current value display.

Delay Before Scan – Delay after power up/wake up, DT2485 and DTSAA loggers only.

Read Top Seg Last – read top DTSAA segment after reading all other segments.

#### IPI 485 Bus

Delay Before Scan – delay before sensor scan.

RS485 Uniaxial SR delay - delay before sending SR command to uniaxial tilt sensors.

RS485 Biaxial SR delay - delay before sending SR command to biaxial tilt sensors.

#### IPI3 ASCII 485 Bus, IPI4 ASCII 485 Bus

RS485 Biaxial SR delay - delay before sending SR command to biaxial tilt sensors.

RS485 TR Tries Number – number of TR tries.

RS485 SR Tries Number – number of SR tries.



#### IPI3 and IPI4 Modbus 485 Bus

Modbus Tries - number of TR tries.

Modbus Timeout.

#### Scan Retry

Enable Scan Retry – perform another scan after failed sensor read.

Retry Chan Max – Maximum failed channels to be rescanned.

Retry Power Off – length of time sensors will be powered off before scan retry.

Auto Stop Scan – stop scan before taking next record.



## 5 LOGGER MENU

Once connected to the data logger, the software should automatically establish communication link and display connected status. If this does not occur, verify the port number and communication cable, or refer to Section 9.1 for more help.

The DT Logger Host user interface contains six tabs: *Connections, Status, Monitor, Data View, Logging* and *Sensors*. Each tab option is explained in detail below. Until successful logger connection, all tabs are inaccessible except *Connections, Status and Data View.* A Help button is available in the bottom right corner, which launches the appropriate help files when pressed.

## 5.1 DT2011B, DT2055, DT2055B, DT2040 VIBRATING WIRE DATA LOGGERS

## 5.1.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Logger Modet DT2011B E	LE0810B VW Sing	je Channel	Seria	al Number:	012345			CONNEC	
Installed Sensors: 2	nel VW Logger D1 2	20118	Firm	ware Version: Sensor Num:	2			Sur-	TESSAGE
Supported Features:								-	100
Sampling									
Status:	LOGGING			Interval Rat	e: FD/ED	)			- T
Current Interval:	12 hours 00 minu	Aes 00 sec	onds		Logar	cattions undated	00	256	
Start Time:	Monday, June 1	5, 2020, 1	1:06:30 AM	М	2020/	06/20 16-45-22	URL .		30
Current Time:	Tuesday, June 3	0, 2020, (	04:47:58 P	м	2020/	06730 16.43.22		1	
Estimated Fill Time:	>30 Years							TIP	
Battery		Board		Memory		🕹 Cala	t Data		W
Voltage (Past, Present):	0.89 3.28	Rev:	4	Record Num:	1		u Dara	Custom	10.0
Battery Life: 100%		Temp:	24.4 °C	Num of fills:	0				A N
								S	Disconnect
rt Status Status Mes	sage					1100 22	Reconnect	Connect	to selected de

Figure 5-1 – Status tab

#### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, and firmware version. Ensure that the serial number matches what is expected (in this example it is 9925). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established. See Section 5.1.6 for Load Cell Mode instructions.



#### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

#### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 battery replacement instructions. RST loggers use special long-life lithium batteries. For more information, please see Section 8.1. Contact RST for replacement part.

#### Board (USB enabled Loggers only)

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

#### Memory (USB enabled Loggers only)

Shows the current logger memory usage.

#### Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 6.1 for the \*.csv file format.



NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab.* The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.



### 5.1.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in B-units (f<sup>2</sup>x10<sup>-3</sup>) or the thermistor temperature in degrees Celsius or Fahrenheit.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

-	1/4/1		2 TH Service		HSB
	75.0415	Units		🕐 Units	CONNECTED
	75.61 KPa	Format	21.0 °C	Format	
	3 VW/ Sensor	V Units	4 TH Sensor	1 Unit	- 10-5
	10.97 psi	© Graph Format	21.0 °C	© Graph [Format]	
	5 VW Sensor	17 Units	6 TH Sensor	V Units	
	0.71 kPa	C Graph Format	21.9 °C	C Graph	
	7 VW Sensor	V Units	8 TH Sensor	V Units	4.
	35.108 in H2O	C Graph	21.9 °C	C Graph Format	
	9 VW Sensor	[]Unit	10 TH Sensor	V Units	home and home and home and
	8745.1 B	C Graph	21.8 °C	© Graph	
ot	Status Status Message	d to DT20558	USB Pot #	32 Recorr	ect

## Figure 5-2 – Monitor tab

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



## 5.1.3 LOAD CELL MONITOR (DT2055 AND DT2040 ONLY)

In Load Cell Mode, Monitor screen will display average values for all sensors grouped into load cell. Refer to Sections 5.1.6 and 5.1.7 for instructions on how to set up load cell mode. By default, the screen reports in B-units ( $f^2x10^{-3}$ ) or the thermistor temperature in degrees Celsius or Fahrenheit.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

Load Cell Selection LC 1	•		
79.57 k	Pa	Units Graph Format	years
Temp			
21.8 °C	1 U 1 0	inits kaph	
1 VW 1 2 TH Sensor 3 VW 1 21.0 °C 75.62 kPa	4 TH Sensor 5 W/ 1 21.0 °C 87.47 kPa	Activity	3
6 TH Sensor         7 VW Sensor         8 TH Sensor           23.4 °C         8746.7 B         23.5 °C	9 VW Sensor         10 TH Sensor           8747.2 B         23.5 °C		1
t Status Status Message	use and a	32 (Passent)	

## Figure 5-3 – Load cell Monitor tab

The Graphical monitor will display average load cell value.

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



## 5.1.4 SELECTIVE MONITOR (PICK MONITOR DT2040 ONLY)

When monitoring DT2040 sensor data, it might be desirable to see several selected sensors only. This can be achieved by activating Pick Monitor. In Connections tab, select Pick Monitor Mode, and then reconnect logger connection.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

A1 VW 1		[V] Units	A2 Them 1		Unit:	USB
• 7.	57 kPa	Graph     Format	2 •	21.1 °C	C Graph	CONNECTED
43 VW 2		V Units	A4 Them 2		V Units	- 60 -
1.	.27 psi	© Graph	4 •	24.6 °C	C Graph	
45 VW Sensor		V Units	A6 TH Senso	e	V Unit:	1
5 - 3.51	4 in H2O	C Graph Format	6 •	24.7 °C	C Graph Format	
A7 VW Sensor		1 Units	A8 TH Sense	x .	V Units	
7 • 7.	57 mm	Graph Format	8 -	-3.7 °C	C Graph	
~		- Unit	**		[] Units	
		Graph		100	© Graph [Format]	100
	[	Reliesh		Ac	tivity 🥥	
ot Status Status	Messace			UC0 D-4 # 21	Record	

### Figure 5-4 – Pick Monitor tab

The Graphical monitor will display average load cell value.

R

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



## 5.1.5 DATA VIEW

File: DT204 DT2040 EL Label: M Interval: 0:1 Sensor Nur	10_40404040_20200713_12 .E0657C VW Multi Channel ulti Channel VW Logger DT :0 n: 40	21039.csv Logger 2040	S/N: Firmware: Status: Rate: Record Num:	40404040 4.03 LOGGING FD/ED 2742	<u> </u>	Ele	Terester
	Date Time	Battery (V)	S 1 (B Units)	S 2 (deg C)	S 3 (B Units)	S 4 ^	1 1 1 P
1	2020/02/24 10:54:00	3.85	8026.6	22.52	8026.2		
2	2020/02/24 10:55:00	3.85	8026.6	22.53	8026.2		
3	2020/02/24 10:56:00	3.85	8026.6	22.54	8026.2		
4	2020/02/24 10:57:00	3.85	8026.6	22.56	8026.3		- 625
5	2020/02/24 10:58:00	3.85	8026.6	22.57	8026.1		
6	2020/02/24 10:59:00	3.85	8026.5	22.58	8026.1	:	S. 30 -
7	2020/02/24 11:00:00	3.85	8026.6	22.59	8026.1	:	
8	2020/02/24 11:01:00	3.85	8026.6	22.60	8026.1	:	
9	2020/02/24 11:02:00	3.85	8026.5	22.62	8026.1	:	
10	2020/02/24 11:03:00	3.85	8026.5	22.62	8026.1	:	
11	2020/02/24 11:04:00	3.85	8026.5	22.62	8026.2		
12	2020/02/24 11-05-00	3.82	9026 5	22.61	8026.2		Custom
							Disconnect

The Data View tab allows quick preview of logger data files.

Figure 5-5 – Data View tab



NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



### 5.1.6 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.* 

Interval		CONNECTED V
Hour 😥 🏝 Min 0 🏛 Sec 0 🔔	Multi	
Use Fixed Interval     O Use Multi Interval Table (Adv	vanced)	THE THE PARTY OF
Logger Options (24 Hour Time) © Sync To Interval (Midnight)	Memory Options Wrap on Memory Full (Overwrite Data) Stop Logging when Memory Full	
Use Start Time Hour 11 A Min 6 V     Start Now		
Clock Options		
30-Jun-20		
Auto sync date / time		THE NO
Logger Label	Custom Units Label Label 🕹 Apply Settings	
Single Channel VW Logger DT2011B Update Label	Conv Factor 1	
		J Disconnect
ort Status Status Message	USB 22 Reconnect	Connect to selected dev

Figure 5-6 – Logging tab

**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

#### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



Multi Interval				*# D+	×
-Multi Interva	Table - Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	1
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals:	120	151469d 04h 00m 50s
			Exit &	Save	Cancel Update Totals

## Figure 5-7 – Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.

**NOTE:** Each interval MUST have iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configurations. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

#### Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Sync To Interval: The interval will be verified to ensure data will be taken at midnight.



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

#### Load Cell Mode

The load Cell mode can be activated to display average sensor values in Monitor Tab. This setting is useful when all connected sensors are a part of a load cell. Data file download will have average values columns when downloaded in Load Cell mode.

#### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

#### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the Sync to Computer Date / Time and clicking Apply synchronizes the data logger clock to that of the PC it is currently connected to. Checking the Auto Sync Date / Time checkbox will update data logger internal clock each time Apply button is pressed.

#### Logger Label

Custom label can be entered if desired.

#### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

#### 5.1.7 SENSORS

The Setup dialog shows current sensor configuration. Sensor types and sensor number can be modified using the following controls:

#### Add VW, Ins VW (DT2055, DT2055B and DT2040 Loggers only)

To add another vibrating wire sensor to the end of the list, click Add VW button. The screen will change to VW mode. To insert sensor at the current position, click Ins VW.

#### Add Therm, Ins Therm (DT2055, DT2055B and DT2040 Loggers only)

To add thermistor sensor to the end of the list, click Add Therm button. The screen will show controls for setting up thermal sensor. To insert sensor at the current position, click Ins Therm.

#### New Copy

When adding subsequent sensors with identical parameters, click New Copy.



#### **Delete Sensors**

Used to remove currently displayed sensor from logger configuration. All sensors except first two can be removed as well.

1 VW	Advanced	VW 3 Y Therm 3 Y VW 4 Y Therm 4 Y VW 5	10 10	CONNECTED V
Normal (1200Hz-3550Hz)	•	Thems Channel 🚽	💠 Add VW	TRANSFER T
Z Enable Engineering	Units Tem	serature Calibration Factor K: 1 //C	🦛 Ins W/	En A
Conversion Method	Polynomial	Initial Temperature To: 25	+ Add Them	
Linear Conversion Calibration Factor G:	-1.00000e+000 kPa/8	Units Conversion	- Ins Them	
Zero Reading Ro:	0.00000e+000 B	loss é llade (kPa	- Del Sel 🔻	•
G × (Ro	- R)	Output Links (KPa	Ge Upload to	10-10
Polynomial Conversion	0.00000e+000 kPa/8 <sup>4</sup>	Outred Officet 0.00000e+001 kPa	Load from	
Coefficient B	1.00000e+000 kPa/8		File	010
Coefficient C	0.00000e+000 B	Last Update: 2016/12/26 00:31:07	Save to File	
(A × R²) + (	B × RJ + C	Format Knew Copy	Detect Sensors	DT2306 DT2033
				DT2350

Figure 5-8 – Sensors tab

#### VW Sensor Type

A drop-down menu allows the user to select from a list of pre-set sweep frequency settings. The software also allows a custom, user defined sweep frequency for use with non-standard vibrating wire sensors. To select this option, choose the "Custom (Advanced)" from the drop-down menu, then click the "Advanced" button. Edit the required fields if necessary and click *Edit Sweep* to determine the remaining parameters.

Vibrating Wire Advanced	X
Custom VW Settings	
Start Frequency (Hz)	1200
End Frequency (Hz)	3550
Delay After Sweep (ms)	75
Receive Pulse Count	100
Edit Sweep Sweep Time (ms)	125
Half Freq Count	2
Frequency decrement	9
Load defaults Load Custom	Save As Custom

Figure 5-9 – Custom vibrating wire settings

lculate	e Decrement a	and Sweep Time	X
Half	Cycle Count	Decrement	Sweep Time (ms)
$\odot$	1	5	113
$\odot$	1	4	141
$\odot$	2	10	113
۲	2	9	126
0	3	14	122
$\odot$	3	13	131
$\odot$	4	19	120
$\odot$	4	18	127
Swe	en Time (ms)	125	Decalc
	ОК		Cancel
_			

## Figure 5-10 – Decrement and Sweep Time options

Enter the desired Sweep Time and click *Recalc.* The program will calculate Decrement and Sweep Time and give option to choose optimal parameters. Click OK button on both dialogs to write settings to the logger memory.

Often the user may wish to report the readings directly in engineering units, rather than B-units ( $f^2x10^{-3}$ ). Data required for the conversion to engineering units is always found on the calibration sheets for the transducer.



Each transducer is shipped from the factory with a calibration sheet. If you have not received a calibration sheet, or the sheet has been lost, please contact RST Instruments and a copy will be faxed or e-mailed to you.

To edit sensor labels, double-click sensor tab and edit label

#### **Conversion Method**

The user is given an option to apply either a *Linear* or *Polynomial* Conversion. If *linear conversion* is selected, input the provided Calibration Factor and Zero Reading into the appropriate boxes.

If *polynomial conversion* is selected, input the provided coefficients (A, B & C) into the appropriate boxes.

In each case, equations used for calculations are shown for a reference.

#### **Temperature Correction**

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument. Then select thermistor sensor used to read temperature. If the calibration sheet is missing, please contact RST Instruments and a copy of the calibration sheet can be faxed or e-mailed to you.

#### **Units Conversion**

*Units Type:* Choose pressure, distance, force, strain, VW temp, incline or custom units using the drop-down menu.

*Input Units:* These are the units of the calibration constants you inputted into either the linear conversion or polynomial conversion methods. In general, the calibration constants reported on the calibration sheets are either in kPa/B unit or psi/B unit. In the case of strain gauges, this could be mm/B unit.

*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

*Output Offset:* This is a user defined offset value. Under certain circumstances, the user may wish to enter in the elevation of the pressure transducer. In this way the reported pressure will be correlated to a reference elevation (i.e. above sea level).

#### Thermal Sensor Type

A drop-down menu allows the user to select the type of thermistor. The following thermistor types can be selected:

- 3K NTC (default)
- 2252 NTC
- 2K RTD
- 5K NTC
- 10K NTC

#### Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.



#### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the

Logging tab. The program will prompt you to confirm the erasing of data from its memory.

#### Save to File (DT2011B, DT2055, DT2055B and DT2040 Multi Channel Logger only)

Current sensor settings can be saved to a file for later retrieval.

#### Load from File (DT2011B, DT2055, DT2055B and DT2040 Multi Channel Logger only)

Click this button to load previously saved sensor settings.

#### Detect Sensors (DT2055, DT2055B and DT2040 Multi Channel Logger only)

Once sensor configuration is saved and sensors connected, click on *Detect Sensors* to detect, and verify current setup. Each connection is tested and results displayed. The following parameters are shown:

- Sensor label
- Pre-configured (Expected) sensor type
- Detected sensor type
- Measured sensor resistance in Ohms

When detected sensor parameters appear correct, background color turns green, otherwise background color turns red to indicate error.

The sample screen is shown on Figure 5-11.



\*See Section 8 for more information about batteries

## Figure 5-11 – Verify VW and temp sensor connections

## 5.2 **DT4205 4 TO 20MA LOGGER**

## 5.2.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Logger Modet DT4205 EL Name: MultiChanny	E0881B 420mA Mu el 420mA Logger D	lti Channel Seri T4205 Fitte	al Number: ware Version:	05018 v3.48			
Installed Sensors: 2 Supported Features:	2	Max	Sensor Num:	10			See of the second
Sampling Status:	LOGGING		Interval R	ete: FDÆD			
Current Interval:	12 hours 00 minu	es 00 seconds Logger settings updated on:			0		
Start Time:	Wednesday, Nov	ember 21, 2018, 12	aber 21, 2018, 12:00:00 PM		/13 14:55:36		2.
Cuttent Time:	ve: Monday, July 13, 2020,					1.0	a ha
condied Fill Fille.	730 Teals						1
Battery Voltage (Past, Present):	0.00 3.70	Board Rev: 4 Temp: 22.6 °C	Memory Record Num Num of fills:	1	Ł Collect Data	Custom	
						J Daco	med

## Figure 5-12 – 4 to 20mA Logger Status tab


### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 05018). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

#### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

#### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 DT4205 battery replacement instructions. The DT4205 logger uses special long-life lithium batteries. Please see 8.1 for more information and contact RST for replacement part.

### Board

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

#### Memory

Shows the current logger memory usage.

#### Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 6.2 for the \*.csv file format.



**NOTE:** When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file.

The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.



After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

# 5.2.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in mA of the detected current.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

1 420	imA 1	Units	2 Therm 1	🗸 Units	
	4.03 mA	Graph     Format	22.2 °C	C Graph	100
3 420	mA 2	<b>V</b> Units	4 Therm 2	<b>Units</b>	-
	8.06 kPa	C Graph	22.2 °C	C Graph	
5 420	Sensor	🔽 Units	6 TH Sensor	<b>Units</b>	-200
	12.09 mm	Graph     Format	22.2 °C	Graph     Format	Ę,
$\times$		Units	*	Units	10000
		Graph		Graph	TREEMAG
~		(Poimac)	*	[Formax]	10
		Graph		Graph Activity	2.00
J		Format	1	[Format]	12

Figure 5-13 – 4 to 20mA Logger Monitor tab

B

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.2.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



# 5.2.3 DATA VIEW

File: DT4: DT42058 Label: Interval: 0 Sensor N	205_0000000000000_2020 ELE0881B 420mA Multi Chan MultiChannel 420mA Logger [ 0:1:0 um: 2	0402_120224.cr nel Logger 0T4205	S/N: Firmware: Status: Rate: Record Num:	0000000000 4.03 LOGGING FIXED 16	 Ele	yanaa
#	Date Time	Battery (V)	S 1 (mA)	S 2 (mA)	*	The street
5	2020/04/02 11:31:04	2.00	NAN	NAN		- 464
6	2020/04/02 11:40:00	2.00	NAN	NAN		
7	2020/04/02 11:41:00	2.00	NAN	NAN	_	
8	2020/04/02 11:43:00	3.32	4.025725	0.018826		
9	2020/04/02 11:46:00	3.32	4.026478	0.018073		
10	2020/04/02 11:47:00	3.32	4.025725	0.018073		
11	2020/04/02 11:48:00	3.32	4.026478	0.018826		100
12	2020/04/02 11:49:00	3.32	4.025725	0.018826	-	Contraction of the second
13	2020/04/02 11:51:33	3.32	4.025725	0.018073		
14	2020/04/02 11:53:00	3.32	4.025725	0.018073		
15	2020/04/02 11:54:00	3.32	4.025725	0.018826		have been a
16	2020/04/02 11:55:00	3.32	4.025725	0.018826	-	Custom A
						J Disconnect
	Cata Name					Connect to selected de

The Data View tab allows quick preview of logger data files.

Figure 5-14 – 4 to 20mA Logger Data View tab



NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



# 5.2.4 LOGGING

The Logging tab contains four main components: Interval, Logger Options, Clock Options and Logger Label.

eT DT Logger Host		
< Connections 🚮 Status 🚍 Data View 📃 Mont	tor 🗐 Logging 🎲 Sensors	
Interval Hour 12 A Min 0 Sec 0 A © Use Fixed Interval © Use Multi Interval Table (Adv	Multi Interval vanced)	Western
Logger Options (24 Hour Time)  Sync To Interval (Midnight)  Use Start Time Hour 12 A Min 0 A  Start Now	Memory Options Wrap on Memory Full (Overwrite Data) Stop Logging when Memory Full	
Clock Options		
Auto sync date / time		
Logger Label	Custom Units Label Label Apply Settings	Custom
Multuharnel 420114 Logget D1 4205		J Disconnect
Port Status Status Message 6 Connected to DT4205	USB 4 Reconnect.	Connect to selected device only Ext

Figure 5-15 – 4 to 20mA Logging tab



**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

#### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



-Mulu Interva	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals	120	151469d 04b 00m 50s

# Figure 5-16 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configurations. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

#### Logger Options

*Use Start Time:* A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

#### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

#### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

#### Logger Label

Custom label can be entered if desired.

#### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

### 5.2.5 SENSORS

The Setup dialog shows current sensor configuration. Sensor types and sensor number can be modified using the following controls:

#### Add 420, Ins 420

To add another 420 sensor to the end of the list, click Add 420 button. The screen will change to 420 mode. To insert sensor at the current position, click Ins 420.

#### Add Therm, Ins Therm

To add thermistor sensor to the end of the list, click Add Therm button. The screen will show controls for setting up thermal sensor. To insert sensor at the current position, click Ins Therm.

#### New Copy

When adding subsequent sensors with identical parameters, click New Copy.

#### **Delete Sensors**

Used to remove currently displayed sensor from logger configuration. All sensors except first two can be removed as well.



# Figure 5-17 – 4 to 20mA Logger Sensors tab

To edit sensor labels, double-click sensor tab and edit label.

Often the user may wish to report the readings directly in engineering units, rather than mA.

#### **Conversion Method**

Engineering values are calculated using linear conversion.

The user is given two options to apply a Linear Conversion:

- Coefficient Input. Enter Calibration Factor BM and Zero Reading CZ.
- Range Input. Input current and engineering calibration limits into appropriate boxes.

The option is also given to modify the sensor offset.

Equation used for calculations is shown for a reference.

#### **Temperature Correction**

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument. Then select thermistor sensor used to read temperature. If the calibration sheet is missing, please contact RST Instruments and a copy of the calibration sheet can be faxed or e-mailed to you.

#### **Units Conversion**

*Units Type:* Choose pressure, distance, force, strain, VW temp, incline or custom units using the drop-down menu.



*Input Units:* These are the units of the calibration constants you inputted into either the coefficient or range conversion methods.

*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

*Output Offset:* This is a user defined offset value.

#### Thermal Sensor Type

A drop-down menu allows the user to select the type of thermistor. The following thermistor types can be selected:

- 3K NTC (default)
- 2252 NTC
- 2K RTD
- 5K NTC
- 10K NTC

#### **Display Format**

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

#### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.



**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by clicking on *Apply Settings* under the *Logging tab.* The program will prompt you to confirm the erasing of data from its memory.

#### Save to File

Current sensor settings can be saved to a file for later retrieval.

#### Load from File

Click this button to load previously saved sensor settings.

#### **Detect Sensors**

Once sensor configuration is saved and sensors connected, click on *Detect Sensors* to detect, and verify current setup. Each connection is tested and results displayed. The following parameters are shown:

- Sensor label
- Pre-configured (Expected) sensor type
- Detected sensor type



• Measured sensor resistance in Ohms

When detected sensor parameters appear correct, background color turns green; otherwise background color turns red to indicate error.

The sample screen is shown on Figure 5-18.

Exp: 420 Found: 420 Res: 5090.2	420mA 2 Exp: 420 Found: 420 Res: 5090.2	420 Sensor Exp: 420 Found: 420 Res: 5090.2	Exp: None Found: Open C. Res: 2082034.8	Exp: None Found: Open C. Res: 2082034.8	P Dete
Therm 1 Exp: Therm Found: Therm Res: 11298.3	Therm 2 Exp: Therm Found: Therm Res: 11295.3	TH Sensor Exp: Therm Found: Therm Res: 11287.7	Exp: None Found: Open C. Res: 2082034.8	Exp: None Found: Open C. Res: 2082034.8	Exit
P1	P2	P3	P4	P5	
1		V STAN			

Figure 5-18 – Verify 420 and temp sensor connections



# 5.3 IC6560, IC6660, DTL201B AND DTL202B TILT LOGGERS

# 5.3.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Logger Model: IC6656L Till	Logger	Seri	al Number: 0	5018		
Name: Tilt Logger		Firm	ware Version v	1.03		
Installed Sensors: 2		Mai	Sensor Num: 2	2		- Bar Too
						Jacobiera State
						En la
Sampling						1
Status:	LOGGING		Interval Rate:	FIXED		
Current Interval	12 hours 00 minut	tes 00 seconds		3 5	3 33 33	
Start Time:	Saturday, January	01, 2000, 12:01:0	00, 12:01:00 AM Logger settings updated on:			
Current Time:	Saturday, January	01, 2000, 12:02:3	0, 12:02:38 AM 2016/09/06 09:19:30			R. S
Estimated Fill Time:	>30 Years					
Battery		Board	Memory		a 1	ad some
Voltage (Past, Present):	3.68	Rev. 2	Record Num	2562	Collect Data	
Battery Life: 30.2%		Temp: 21.2 °C	Num of fills:	2		DT2306 DT2033
						DT2350

Figure 5-19 – Tilt Logger Status tab

### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 05018). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.



### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 for Tilt Logger battery replacement instructions. The Tilt Logger uses special long-life lithium batteries. Please see Section 8.1 for more information and contact RST for replacement parts.

#### Board

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

#### Memory

Shows the current logger memory usage.

#### Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 6.3 for the \*.csv file format.



**NOTE:** When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file.

The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.



# 5.3.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in sine of the detected inclination.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

1 TR 1		Eng Display		CONNECTED V
	2.845 deg	Degrees • Graph Format	l	
218.2	139.17 mm	Eng Display     Degrees *     Graph     Format		
			Activity	

# Figure 5-20 – Tilt Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.2.5 for the instructions on entering calibration data.
 Until communication is established with the data logger, the program will display "-----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



# 5.3.3 DATA VIEW

File: C:\U IC6656L Label: Interval: 1 Sensor N	sers\Win7_64\Documents\\ TitLogger TitLogger 120.0 um: 2	fultichanneN/C66	S/N: Firmware: Status: Rate: Record Num	05018 1.03 LOGGING FDÆD 70	<u> </u>	Eile	
:	Date Time	Battery (V)	S 1 (sin)	S 2 (mm)		*	
1	2015/04/08 17:18:24	3.71	-0.001	130.071		=	
2	2015/04/08 17:18:31	3.71	-0.001	130.071			V38/ 2.V.
3	2015/04/09 05:18:29	2.85	-0.310	126.687			
4	2015/04/09 17:18:29	2.85	-0.310	126.889			
5	2015/04/10 05:18:29	2.85	-0.310	126.706			
6	2015/04/10 17:18:29	2.85	-0.310	126.861			10. 10.
7	2015/04/11 05:18:29	2.85	-0.310	126.422			
8	2015/04/11 17:18:29	2.85	-0.310	126.510			
9	2015/04/12 05:18:29	2.85	-0.310	126.370			
10	2015/04/12 17:18:29	2.85	-0.310	126.490			
11	2015/04/13 05:18:29	2.85	-0.310	126.355			1. 1
12	2015/04/13 17:18:29	2.85	-0.310	126.482			No.
12	2015/04/14 05:19:29	2.95	.0 310	126 333		-	
ort Statu	s Status Message	ed to IC6656	3L	us 	68 Port # 29	Reconnect	

The Data View tab allows quick preview of logger data files.

Figure 5-21 – Tilt Logger Data View tab



NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



# 5.3.4 LOGGING

The Logging tab contains four main components: Interval, Logger Options, Clock Options and Logger Label.

Connections Status Data View Mont Interval Hour 12 Min 0 Sec 0 M	tor ILogging Sensors Multi Interval	
Clock Options Clock Options January -01-00 Auto sync tate / time Sunc to computer	Memory Options  Whap on Memory Full (Overwrite Data)  Stop Logging when Memory Full	
Logger Label Tit Logger Update Label	Custom Units Label mm/m Conv Factor 1000	072306 DT2033 DT2050
Port Status Status Message	USB Port # 123 Reconnect	Connect to selected devi only

Figure 5-22 – Tilt Logging tab

**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

#### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



- Multi Interva	I Table – Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals:	120	151469d 04h 00m 50s

# Figure 5-23 – Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

#### Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the* 

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

#### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

#### Logger Label

Custom label can be entered if desired.

#### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

### 5.3.5 SENSORS

Tilt sensors come in two hardware configurations: uniaxial and biaxial. The second B sensor can be enabled or disabled in biaxial units. Use Copy to B to quickly transfer settings from A sensor.

OT DT Logger Host		×
< Connections 🏠 Status 🚍 Data View 📃 Monitor 🗿 Logging 🗔 Sen	sors	Admin
	Total Sensor # 2	
1     IIIt       Image: Engineering Units     Sensor Type       Linear Conversion     Calibration Factor G:       Zero Reacting Rev     0.0258		
G × (Ro · R) Units Conversion Units Type: Distance Input Units: Sin (Angle)		
Output Units: mm Output Offset: 0 mm Last Lindete Date: 2015/09/06/09/19:30	Logger Logger File	
Display Format Copy to B	File	DT2306 DT2033 DT2350
Port Status Status Message USB Port # 12	23 Reconnect	Connect to selected device only Ext

Figure 5-24 – Tilt Logger Sensors tab

Often the user may wish to report the readings directly in engineering units, rather than sin(angle)

#### **Conversion Method**

The user is given an option to apply *Linear* Conversion. Input the provided Calibration Factor and Zero Reading into the appropriate boxes.



Figure 5-25 – Tilt Distance Calibration

### **Units Conversion**

*Units Type: Currently only* distance and incline conversion is available. *Input Units:* Currently set to sin(angle).



*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

### Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

### Copy to B

Used for adding subsequent sensors with identical parameters

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.

The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

### Save to File

Current sensor settings can be saved to a file for later retrieval.

#### Load from File

Click this button to load previously saved sensor settings.



# 5.4 **DT2306 POTENTIOMETER LOGGER**

# 5.4.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Logger Model: DT2306 Lin Name: DT2306 Lin	ear Pot Multi Char ear Pot Logger						
Installed Sensors: 1 Supported Features:	B DTLink Enabl	Ma ed	x Sensor Num:	18		- presser	
Sampling	LOCCINC		- Internet Bat			The Ale	
Status:	10 Logaina		interval hat	e PIAEL		10 M	
Current Interval	12 nours 00 mm	Thursday, Loss 02, 2010, 10,20,40,4M			Logger settings updated on:		
Start Time:	Thursday, June	AM	2035/	2.0			
Current Time:	Vednesiday, May 03, 2017, 12:45:55 PM >30 Years						
Estimated Fill Time:					120		
Battery Voltage (Past, Present)	0.91 3.26	Board Rev. 4	Memory Becord Num	373	Collect Data	Se W	
Battery Life: 0.0%		Temp: 23.7 °C	Num of fills:	0		DT2306	

Figure 5-26 – DT2306 Status tab

### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 01002). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

#### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

#### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.



Refer to Section 8 for information about battery life and battery replacement. The DT2306 Logger uses special long-life lithium batteries; contact RST for replacement part.

#### Board

Board revision level is helpful for diagnostic purposes.

#### Memory

Shows the current logger memory usage.

#### **Collect Data**

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 0 for the \*.csv file format.



NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

### 5.4.2 MONITOR

memory.

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

Connections	G Status	Data View	Logging Ly	Sensors		CD
1 LP16 1		Units	2 LP16 2	Units	U	SB
1	1.57 mm	Graph     Format	49.96 mm	C Graph		AREGIED ¥
3 LP16 1		Units	4 LP16 1	Units		0 =
1	1.78 mm	Graph Format	11.76 mm	C Graph		Jeconor
5 LP16 1		V Units	6 LP16 1	Units		1 14
4	9.96 mm	Graph Format	11.56 mm	Graph Format	V S	
7 LP16 1		V Units	8 LP16 1	🔽 Units	m -	
1	2.15 mm	Graph Format	49.96 mm	C Graph	Graph	
9 LP16 1		V Units	10 LP16 1	Units		a La
	0.00 mm	Graph Format	100.00 mm	Graph Format	Activity	~ 1
					DT	2306
Status	Ratus Message		USB Port	# 116	Beconnect	Connect to selected

Figure 5-27 – DT2306 Logger Monitor tab

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.4.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "---- " in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.



# 5.4.3 DATA VIEW

ile: DT2 DT2306 I abel: nterval: ( Sensor N	305_00000000000000_2016/ Linear Pot Multi Channel Logg Multi Channel Linear Pot Logg 10:30 um: 18	)511_175312.cs er er	S/N: Firmware: Status: Rate: Record Num:	000000000000 3.28 LOGGING FIXED 13		Ele	
	Date Time	Batteru M	S 1 (mm)	\$ 2 (mm)	5.3 (mm)	< ^	Testing.
1	2016/06/11 17:49:01	2.00	42	42	42		Sel alla
2	2016/05/11 17:43:01	2.00	43	43	43		VIII 2 100
2	2016/05/11 17:45:50	2.00	43	43	43		
4	2016/05/11 17:50:00	2.00	43	43	43		and the second
5	2016/05/11 17:51:00	2.00	43	43	43	E	
â	2016/05/11 17:51:49	2.00	43	43	43		A. 85
7	2016/05/11 17:52:30	2.00	43	43	43		
8	2016/05/11 17:53:00	2.00	43	43	43		10 M
9	2016/05/11 17:53:30	2.00	43	43	43		
10	2016/05/11 17:54:00	2.00	43	43	43		THE INC
11	2016/05/11 17:54:30	2.00	43	43	43		1 N
12	2016/05/11 17:55:00	2.00	43	43	13	*	
•						•	DT2306
t Statu	s Status Message			1151	8 Port # 116	Reconnect	Connect to selected d

The Data View tab allows quick preview of logger data files.

Figure 5-28 – DT2306 Logger Data View tab



NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



# 5.4.4 LOGGING

The Logging tab contains four main components: Interval, Logger Options, Clock Options and Logger Label.

Hour 12 Min 0 Sec 0 (	Multi Interval Vanced]
Logger Options (24 Hour Time)     Sync To Interval (Midnight)     Use Start Time Hour 10 * Min 36 *     Start Now	Memory Options © Wrap on Memory Full (Overwrite Data) O Stop Logging when Memory Full
Clock Options May -03-17  Auto sync date / time Sync to computer date / time	
Logger Label	Custom Units Label Label 🔶 Apply Settings
DT2306 Linear Pot Logger Update Label	Conv Factor 1 DT2306

Figure 5-29 – DT2306 Logging tab

**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



- Multi Interva	I Table – Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals:	120	151469d 04h 00m 50s

# Figure 5-30 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

#### Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

#### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

#### Logger Label

Custom label can be entered if desired.

#### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

## 5.4.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.



# Figure 5-31 – DT2306 Logger Sensors tab

Often the user may wish to report the readings directly in engineering units, rather than in percentage.

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab.* The program will prompt you to confirm the erasing of data from its memory.

### Save to File

Current sensor settings can be saved to a file for later retrieval.

#### Load from File

Click this button to load previously saved sensor settings.



# 5.5 **DT2485, DT2033 DT-BUS LOGGERS**

# 5.5.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Logger Model: DT2485 IPI	Logger	Seria	al Number:	DT50353			
Name: IPI Logger I	DT2485	Firm	ware Version:	v4.04		100	(Filling
Installed Sensors:	36	Max	Sensor Num:	170			Station .
Supported Features:						-	11.00
Sampling						1	-
Status:	LOGGING		Interval Rate	e: FIXED			
Current Interval:	12 hours 00 minu	ites 00 seconds		- Longer selfings up	100	à	
Start Time:	Thursday, July 2	3, 2020, 05:37:39 Pt	đ	2020/07/202174		Sec. 1	
Current Time:	Monday, July 27	, 2020, 01:00:07 PM		2020/07/23 17:4	3:00	~	
Estimated Fill Time:	>30 Years					THE	10
Battery		Board	Memory				W
Voltage (Past, Present):	3.70 3.84	Rev: 2	Record Num:	3	Collect Data	Custom	
		Temp: 24.8 *C	Num of fills:	0		Custom	Ę.
						1	Disconnect

Figure 5-32 – DT-BUS Logger Status tab

### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 50353). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.



Refer to Section 8 for information about battery life and battery replacement. The DT2485 Logger uses special long-life lithium batteries; contact RST for replacements.

#### Board

Board revision level is helpful for diagnostic purposes.

#### Memory

Shows the current logger memory usage.

#### Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 6.4 for the \*.csv file format.



**NOTE:** When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file.

The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

## 5.5.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in sine.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

There are two modes of monitor display: Select Mode and List Mode. Mode switching is available in Logger Options (Section 4.4).



# 5.5.2.a SELECT MONITOR MODE

ar DT Logger Host	agging C2 DTBus	
Node : 1	1 - 80019 Axis A 1	All The
0.478 deg	Eng Display Degrees Format	The second secon
-0.162250 sin	Eng Display Sine Format	
23.3 °C	Activity	Custom
Port Status Status Message Cached state loaded.	USB 8 Reconnect	Connect to selected device only

Figure 5-33 – DT-BUS Logger Monitor tab – Select Mode

Crach	Label/Deeth	Tree	Desdee	Addres t	CUNNECTED	-
Graph	Laber/ Depth	The IDIO	Reading	Addres	Eng Display	-
1	Axis A 1	TITA IPI3	-0.089230 sin	79001	Tit Units	
□ 2	Axis B 1	THE B IPI3	0.076570 sin	79001	Sine	<b>SIN</b>
3	Temp 1	Temp IPI3	24.3 °C	79001	120 I	1
4	Axis A 2	Tilt A IPI3	-0.095074 sin	79002	Star 1	13
5	Axis B 3	Tilt B IPI3	0.090746 sin	79002		
6	Temp 3	Temp IPI3	24.3 °C	79002		-
7	Axis A 3	Tilt A IPI3	-0.092145 sin	79003		•••
8	Axis B 4	Tilt B IPI3	0.086801 sin	79003	100	\$
9	Temp 4	Temp IPI3	24.3 °C	79003		4
10	Axis A 4	Tilt A IPI3	-0.106023 sin	79004		~
11	Axis B 5	Tilt B IPI3	0.078332 sin	79004		1
12	Temp 5	Temp IPI3	24.3 °C	79004	Activity	-
13	Axis A 5	Tilt A IPI3	-0.106961 sin	79005		-10
	A.G. D.C.	TA 0 1010	0.000074.41	70005	Custom	
					J Dec	onnec

# 5.5.2.b LIST MONITOR MODE

Figure 5-34 – DT-BUS Logger Monitor tab – List Mode



**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.5.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.

# 5.5.3 DATA VIEW

Conn	ections 🟠 Status	Data View	Monitor	El Logging	DTBus	1	
File: DT2 DT24851 Label: Interval: ( Sensor N	485_50017_20180814_1557 PILogger IPILogger DT2485 b:1:0 um: 3	12.csv	S/N: Firmware: Status: Rate: Record Num:	50017 3.50 LOGGING FD/ED 3965		Ele	Tenner
#	Date Time	Battery (V)	S 1 (mm)	S 2 (Label)	S 3 (Units)	*	No.
1	2017/12/15 17:20:00	2.00	-23.566175	-24.250000	12.000000		
2	2017/12/15 17:21:00	2.00	-23 562792	-24.250000	9.000000		
3	2017/12/15 17:22:00	2.00	-23.559408	-24.000000	9.000000		
4	2017/12/15 17:23:00	2.00	-23.559408	-24.000000	9.000000		
5	2017/12/15 17:24:00	2.00	-23.562792	-24.000000	9.000000		
6	2017/12/15 17:25:00	2.00	-23.556023	-24.000000	9.000000		
7	2017/12/15 17:26:00	2.00	-23.559408	-23.750000	9.000000		
8	2017/12/15 17:27:00	2.00	-23.552639	-23.750000	9.000000		
9	2017/12/15 17:28:00	2.00	-23.566175	-23.750000	9.000000		
10	2017/12/15 17:29:00	2.00	-23.562792	-23.500000	9.000000		
11	2017/12/15 17:30:00	2.00	-23.559408	-23.500000	9.000000		hard the here here
12	2017/12/15 17:31:00	2.00	-23.559408	-23.500000	9.000000		Custom
12	2017/12/15 17:22:00	2.00	.22 576229	.22 500000	9.000000	*	
							Disconnect
rt Statu	s Status Message				USB 8	Reconnect	Connect to selected der

The Data View tab allows quick preview of logger data files.

# Figure 5-35 – DT-BUS Logger Data View tab





# 5.5.4 LOGGING

The Logging tab contains four main components: Interval, Logger Options, Clock Options and Logger Label.

Connections 🚮 Status 🛅 Data View 💻 Monit	tor 📲 Logging 🕼 DTBus	
Interval Hour 😰 🔔 Min 0 🔔 Sec 0 🚊 🖲 Use Fixed Interval 💿 Use Multi Interval Table (Adv	Multi Interval vanced)	The second
Logger Options (24 Hour Time)  Sync To Interval (Midnight)  Use Start Time Hour 17 × Min 37 × Start Now	Memory Options  Vrap on Memory Full (Overwrite Data)  Stop Logging when Memory Full	
Clock Options 27- Jul -20 Auto sync date / time Sync to computer		
Logger Label IPI Logger DT2485 Update Label	Custom Units Label Label Apply Settings	Custom
Port Status Status Message	USB 8 Reconnect	Disconnect Connect to selected device only Evit

Figure 5-36 – DT-BUS Logging tab



**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

Hard Inter va	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totalo	100	1514604 04h 00m 50

# Figure 5-37 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 250,000 records with one biaxial sensor connected, and 8,000 records in 85 sensor configuration. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the *"Update Totals"* button. To save changes, click the *"Exit & Save"* button.

### **Logger Options**

*Use Start Time:* A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day.* 

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.



### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

#### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the Sync to Computer Date / Time and clicking Apply synchronizes the data logger clock to that of the PC it is currently connected to. Checking the Auto Sync Date / Time checkbox will update data logger internal clock each time Apply button is pressed.

#### Logger Label

Custom label can be entered if desired.

#### **Apply Settings Button**

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

## 5.5.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.

DT-BUS logger supports two sensor types:

- DT-BUS sensors, currently RST Tilt IPI, IPI3, IPI4, RST Tiltmeter, RST Thermarray and RST Precision Liquid Settlement Array (PLSA).
- Modbus sensors, integer, and float types
- **Beaded**stream temperature array

Both DT-BUS and Modbus type sensors can coexist on the same RS485 bus, except for RST Tilt IPI4 sensor.

Beadedstream temperature array and PLSA cannot coexist with any other sensor types.



# 5.5.5.a DT-BUS SENSORS CONFIGURATION

Axis A 5			RST	IP13 IP14	Mode	Modbus	-	Total Node #	CONNECTED V
5 Axis A		Baxial +	#	Serial	MB	Туре		8 54	la ma
	RST Tit IPI	Tmp	1	79001	1	A,B,T	٠		TESSEALE!
Enable Engineering Units	Sensor sn:	🕂 Baxial	2	79002	2	A.B.T	٠	M Add Node	
Linear Conversion	40782	- Unincial a	3	79003	3	A.B.T	*	E Inset Node	100
Calibration Factor G: 1	mm	Tmp	5	40782	-	A,0,1	-	- moon wood	10
Zero Reading Ro: 0	sin	J.C. Helevial	6	40783	-	A	+	- Del Sel 🔻	da -
		-ye unata	7	80	-	P	٠	In Martha	
Units Conversion			8	40785	-	т	٠	Nodes	
Units Type: Distance	-								
Input Units: Sin (A	ngle)	Uniaxial						HB Addr Upt	
Output Units: mm	¥							A Upload to	
Output Offset: 0	mm	# 1						Logger	
Reading Delay: 0.10 sec	_	New Copy						💋 File Config	
Last Update Date:	Display	Increment S/N	-						Custom
2021/01/08 16:54:39	- Format	Exclude from						Copuons	
		action acdri	_			_	_		Disconnect
ad Onter Onter Manager									- Connect to selected dep
on status status Message						USB	8	Reconnect	only

# Figure 5-38 – DT-BUS Logger Sensors tab

All currently configured sensors are listed along with sensor index, sensor serial number and sensor type.

RST IPI3 and IPI4 DTBus sensors can be set up in one of two communication modes:

- ASCII mode
- Modbus mode

**NOTE:** Communication mode applies to RST IPI3 and RST IPI4 sensors only. RST IPI, RST Tilt Meter, RST Thermarray and RST Precision Liquid Settlement Array operate in ASCII communication mode only. **Beaded**stream operate in Modbus communication mode only

The sensor list can be modified using following controls:

#### Add Node

To add another RST Tilt IPI, IPI3, IPI4, RST Tiltmeter, RST Thermarray, RST PLSA or Modbus node, click Add Node button. The sensor configuration screen will change to reflect node type. New node will be added to the end of list. To add beadedstream, click *beaded*stream Search to show setup dialog.

Connections	Data view	nitor 📲 Logging L 🖉 D		
		RST IPI3 IPI4 Mode ASCII	Total Node #	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Biaxial +	# Serial Type	0	
	-i- Biaxial		🕂 Add Node	Anna Anna
	Uniaxial + Tmp		RST Tilt IPI (sn 1 RST Tilt IPI3 (sn 7	to 65534) (0000 to 79999)
	- Uniaxial		RST Tilt IPI4 (sn 8	0000 to 89999)
			RST Tilt Meter (s	n 1 to 65534)
			RST Tilt Meter (sr	80000 to 89999)
			RST ThermArray	(sn 1 to 254)
			Generic Modbus	node
	#1	1	beadedstream Se	arch
	· 💾 New Copy			
Last Update Date:	✓ Increment S/	/N	Options	Custom
2022/04/26 18:29:56				Disconnect
ort Status Status Message		LICD		

# Figure 5-39 – DT-BUS Logger Add Sensors menu



**NOTE:** Available sensor menu will depend on logger firmware. Update logger firmware to enable all supported sensor types.

#### Insert Node

To insert sensor at the current position, click Insert Node. The sensor configuration screen will change to reflect node type.

#### New Copy

When adding subsequent sensors with identical parameters, click New Copy. Enter desired copy number to speed up the process

#### Delete Node

Used to remove currently displayed sensor from logger configuration.

#### **Delete All Nodes**

All sensors except first two will be removed.

To update selected node serial number, click on desired serial and type new value.

#### Verify Nodes

Use Verify Nodes feature to verify communication with connected sensors.

#### MB Addr Upt

When using Modbus communication mode, all modbus addresses need to be unique. Use Modbus Address Update button to program sequential modbus addresses into configured nodes.



#### Increment S/N

To help with adding sensors with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.

#### Exclude from sensor scan

Any sensor can be excluded from logger reading.

DT Bus IPI nodes may contain one or more sensors. To change number of child sensors, use the following buttons: *Biaxial* + *Temp*, *Biaxial*, *Uniaxial* + *Temp*, *Uniaxial*.



**NOTE:** When switching between child sensor types, click Uniaxial button first, then new sensor type button. Any unsaved sensors will be yellow highlighted in sensor list.



**NOTE:** RST IPI3 and RST IPI4 are permanently set with biaxial A and B and thermistor sensors.

To edit sensor labels, double-click sensor tab and edit label.

Often the user may wish to report the readings directly in engineering units, rather than generic units.

#### **Conversion Method**

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.



## Figure 5-40 – Tilt Distance Calibration

#### **Units Conversion**

Units Type: Select from the list of available conversions.

Input Units: Depend on sensor type.

*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

*Output Offset:* This is a user defined offset value.


### **Display Format**

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed to update the logger with new information.



**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab.* The program will prompt you to confirm the erasing of data from its

### Save to File

memory.

Current sensor settings can be saved to a file for later retrieval.

#### Load from File

Click this button to load previously saved sensor settings.

RST IPI3 and IPI4 tilt sensors have two modes of operation: ASCII and Modbus. In Modbus mode, each sensor node has modbus address in range 1 to 254. Node serial numbers and Modbus addresses can be manually edited by clicking on "+" in node list.



Figure 5-41 – RST Tilt IPI node address Edit dialog

Serial numbers can be updated in sensor setup without reloading entire sensor setup, if sensor number and sensor's type was not changed.

RST Tilt IPI3 and IPI4 Node Addresses Edit
Update selected sensor
Update serial in logger configuration 80000 Set
Update Modbus address in sensor hardware
Exit

# Figure 5-42 – RST Tilt IPI3 and IPI4 node address Edit dialog

RST Tilt IPI3 and IPI4 Node addresses edit dialog will provide options to read and update Modbus address. This feature is useful when using RST Tilt IPI3 nodes in Modbus mode.



**NOTE:** RST Tilt IPI sensors have serials in the range 1 to 65534. RST Tilt IPI3 sensors have serial numbers in the 70000 to 79999 range. RST Tilt IPI4 sensors have serial numbers in the 79999 to 89999 range. Modbus addresses are between 1 and 254.



Options

Highest sensor addresses in current se	tup	
Used as new address for copy function	n	
RST Tilt IPI Address (1000 to	1000	
RST Tilt IPI3 Address (70000 to	70000	
Tilt IPI4, Tiltmeter Address (80000 to	89999)	84024
IPI3/4 Tilt Modbus Address (1	to 253)	1
Generic Modbus Address (1	to 253)	1
Modbus address update		
IPI3/4 Tilt Modbus Initial Address	1	(1)
IPI3/4 Tilt Modbus Addr Last Update 3	2022/11/1	14 10:59:3
Creat		-

# Figure 5-43 – DT Bus Options dialog

DT Bus Options dialog displays highest IPI sensor serial number and Modbus address. Any displayed value can be changed if necessary. IPI sensor initial Modbus address can be altered. Last Modbus address update date and time is displayed as recorded in logger memory.



**NOTE:** IPI sensors and generic Modbus sensors highest addresses are general settings stored in local computer only.

### 5.5.5.b GENERIC MODBUS SENSORS CONFIGURATION

			1	HSI	IP13 IP14	Mode A	sui	<ul> <li>I otal Node II</li> </ul>	
5 N	IBUS		+ Add Sensor		Serial	Type	-	5 Ext	10 -
	Mode	CDAB •		2	3	M, 1 FR	•	🔶 Add Node	TERME
# Seria	l Type	Label	- Del Sensor	3	4	M, 1 FR		-	(Com)
1 6	Float	Fit 5	A Make Doub	4	5	M, 1 FR	+	🗲 Insert Node	2 10
			- makerioak	5	6	M, 1 FR	•		Vig A
			🥔 Make Int	-				- Del Sel V	
				E				Venity Nodes	
Modbus Start	0		ModBus						3
Function	3		M 1 Flts	_					
Tries	2		# 1	-				Logger	
Timeout	1.00	Calbration	New Copy					S File Config	
Last Up	date Date:		Increment S/N						Custom
2020/07/3	30 11:47:18		Exclude from		_		_	Options	Sec. 1
			- sensor scan						Decorrec

# Figure 5-44 – ModBus Logger Sensors tab



All currently configured sensors are listed along with sensor index, sensor serial number and sensor type. The sensor list can be modified using following controls:

### Add Node

To add another RST Tilt, RST Thermarray, RST PLSA or Modbus node, click Add Node button. The sensor configuration screen will change to reflect node type. New node will be added to the end of list.

### Insert Node

To insert sensor at the current position, click Insert Node. The sensor configuration screen will change to reflect node type.

### New Copy

When adding subsequent sensors with identical parameters, click New Copy. Enter desired copy number to speed up the process

#### **Delete Node**

Used to remove currently displayed sensor from logger configuration.

#### **Delete All Nodes**

All sensors except first two will be removed.

Use S/N entry box to edit selected node serial number. To update selected node serial number, enter new serial into entry box and click *Update*.

#### **Display Format**

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

### Increment S/N

To help with adding sensors with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.



**NOTE:** RST Tilt IPI4 sensors are not compatible with any other RST DT BUS sensors. To add RST Tilt IPI4 nodes, use the *Delete All* button and then right click on the remaining node. Select *Node Convert* to switch to IPI4 node type.



**NOTE:** ModBus sensor nodes have separate serial numbering.

ModBus nodes may contain one or more sensors. To change number of child sensors or sensor type, use the following buttons: Add Sensor, Delete Sensor, Make Float, *Make Int.* 



**NOTE:** When switching between child sensor types, click Uniaxial button first, then new sensor type button. Any unsaved sensors will be yellow highlighted in the sensor list.



Often the user may wish to report the readings directly in engineering units, rather than generic units. Use *Calibration* button to edit each Modbus sensor calibration.

### **Conversion Method**

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.

### **Units Conversion**

Units Type: Select from the list of available conversions.

Input Units: Depend on sensor type.

*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

*Output Offset:* This is a user defined offset value.

ModBus Node Calibrati	on X
6 MBUS	Flt 2
Enable Engineering	Units
Calibration Factor G:	0.03289
Zero Reading Ro:	4.8698
Vinits Conversion	
Units Type: Press	sure 🔻
Input Units: psi	•
Output Units: psi	•
Output Offset: 0	psi
ОК	Cancel

Figure 5-45 – ModBus sensors calibration

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.



**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab.* The program will prompt you to confirm the erasing of data from its memory.

### Save to File

Current sensor settings can be saved to a file for later retrieval.

### Load from File

Click this button to load previously saved sensor settings.

### 5.5.5.C BEADEDSTREAM TEMPERATURE ARRAY CONFIGURATION

To create new configuration, remove all sensors using *Remove All option in button next to Del Sel*, then click *Add Node* button and select **beaded**stream Search menu option. In the pop-up dialog, there are two options:

- Detect and configure connected **beaded**stream automatically
- Configure number of nodes

When using first option, connected **beaded**stream is automatically detected and configured in logger memory.



## Figure 5-46 – Beadedstream Search dialog

Optionally, Modbus address and String reading delay can be customized if necessary.

Connections 😭 Status 🛄 Data	view 📃 Mon	tor 🗐 Lo	gging Lys	UTBUS	
		RST IPI3 IPI4	Mode ASCI	Total Node #	
	h, Biaxial +	# Serial	Туре	0	12 -
	- Biaxial			🕂 Add Node	Jesson
Found 7 Beaded Stream	Unizotal +			Ensert Node	11.
Thermistors in 1 groups.	Message			🔁 💳 Del Sel 🔻	
	DT Logge	Host will now r	econnect to los	d Verfy	
		OK		Upload to	
	CR New Core		_	Logger	
Last Update Date: 2021/10/15 16:48:52	✓ Increment S/1	N		Options	Custom
	-				J Disconnect
A Data Data Nama					

# Figure 5-47 – Beadedstream Search result

The software will inform about search result and reload new settings.

1 B	eaded			#	Mod	Type	1	10.00
				1	1	M, 7 Int		Vienas
# Regist	er Type	Label						ten 1
1 1	ht .'C	Temp_1						
2 1	ht.C	Temp_2					Delete Al	VVR P
3 1	int, C	Temp_3					Nodes	
4 1 5 1	nt.C	Temp_4						
0 I	1.0	Temp_5	·					
+							-	
Modbus Start Reg (he	x) 1							<b>U</b>
Function	4							
Tries	2							
Timeout	1.00							
Last Upda	ste Date:							Custom
2021/10/15	16:48:52							
								Disconnect
								<b>A</b>

# Figure 5-48 – Beadedstream Logger Sensors tab

All currently configured sensors are listed along with sensor index, Modbus address and sensor type.



# 5.6 DT2350 STRAIN GAUGE LOGGER

# 5.6.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

.ogger Model: DT2350 St	rain Gauge Logger	Ser	al Number:	123456		
Name: Strain Gauge Logger DT2350		Fim	Firmware Version: v3.45			and the second second second
nstalled Sensors:	2	Ma	Sensor Num:	2		
Supported Features:						Jacobian Statement
						- FOI
Sampling						The stre
Status:	LOGGING		Interval Bat	e: FIXED		
Current Interval:	00 hours 01 minu	ites 00 seconds		12	2	Die Des
Start Time:	Thursday, June	01, 2017, 04:21:00	PM	Logger se	ettings updated on:	
Current Time:	Friday, June 02,	2017, 04:03:02 PM		2017/06	17/06/02 16:01:38	
Estimated Fill Time:	Friday, Decembe	29, 2017, 02:28:00	AM (			<b>N</b>
altery		Board	Memory		a	and the
/oltage (Past, Present)	0.23 3.89	Rev. 2	Record Num	397	Collect Data	1
Battery Life: 87%		Temp: 27.2 °C	Num of fills:	0		DT2350

Figure 5-49 – DT2350 Status tab



### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 123456). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The DT2350 Logger uses special long-life lithium batteries; contact RST for replacement part.

### Board

Board revision level is helpful for diagnostic purposes.

### Memory

Shows the current logger memory usage.

### **Collect Data**

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 6 for the \*.csv file format.



**NOTE:** When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file. The current memory can also be erased by pressing the *Apply Settings* under the

Logging tab. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.





## 5.6.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

DT Logger Host	ing 🎲 Sensors		Admin
-1.244248 mV/V	Eng Display		
-0.01 mm	Eng Display     Graph     Format		
		Activity	DT2350
Pot Status Status Message           O         G         Connected to DT2350           Image: Status Message         Image: Status Message         Image: Status Message	USB Port # 128	Reconnect	Connect to selected device only Exit

Figure 5-50 – DT2350 Logger Monitor tab

**NOTE:** Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.6.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display "----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, "RANGE\_ERR" will be displayed.

## 5.6.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

Conne	ctions 🚮 Status	Data View	Monitor	El Logging	🧊 Sensors		
File: DT23 DT2350 S Label: 1 Interval: 0 Sensor No	350_123456_20170607_113 Brain Gauge Logger Strain Gauge Logger DT2350 10:15 .0:15 .mr: 2	559.csv )	S/N: Firmware: Status: Rate: Record Num:	123456 3.45 LOG PENDING FIXED 4316	<u> </u>	Eile	
	Date Time	Battery (V)	S 1 (EU)	S 2 (cm)		*	1000 pouring
1	2017/06/06 17:36:31	3.60	-1.000	-0.001			
2	2017/06/06 17:36:45	3.60	-1.000	-0.001			1996
3	2017/06/06 17:37:00	3.60	-1.000	-0.001			10 mm
4	2017/06/06 17:37:15	3.56	-1.000	-0.001			
5	2017/06/06 17:37:30	3.55	-1.000	-0.001			
6	2017/06/06 17:37:45	3.55	-1.000	-0.001			a. a.
7	2017/06/06 17:38:00	3.54	-1.000	-0.001			
8	2017/06/06 17:38:22	3.57	-1.000	-0.001			
9	2017/06/06 17:39:00	3.57	-1.000	-0.000			
10	2017/06/06 17:39:01	3.57	-1.000	-0.000			
11	2017/06/06 17:39:15	3.54	-1.001	-0.001			- Nor
12	2017/06/06 17:39:30	3.53	-1.001	-0.000			
12	2017/06/06 17:39.45	3 63	.1.000	.0.000		+	DT2350
	a						Connect to selected der

Figure 5-51 – DT2350 Logger Data View tab



rs

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



### 5.6.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.* 

Connections 🟠 Status 🚍 Data View 💻 Mont	tor Elogging 2 Sensors	
Use Fixed Interval     O Use Multi Interval Table (Adv	vanced	A /==
Logger Options (24 Hour Time) Sync To Interval (Midnight) Use Start Time Hour 16 A Min 21 A Start Now	Memory Options  Wrap on Memory Full (Overwrite Data)  Stop Logging when Memory Full	
Clock Options		
June -02-17 Auto sync date / time Sync to computer date / time		
Logger Label	Custom Units Label Label	
Strain Gauge Logger DT2350 Update Label	Conv Factor 1	DT2350
nt Status Status Message	USB Port # 128 Reconnect	Connect to selected de

Figure 5-52 – DT2350 Logging tab

**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the "Multi Interval" button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



Hulu Intel Va	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals	: 120	151469d 04b 00m 50s

## Figure 5-53 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

### Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

### **Custom Units**

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab. Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

### Logger Label

Custom label can be entered if desired.

### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

### 5.6.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.



Figure 5-54 – DT2350 Logger Sensors tab

Strain Gauge Logger might be configured for one or two sensors. Use *Add Strain* to add second sensor. *Del Sel* button can be used to delete second sensor. Use *New Copy* to create second sensor configuration and copy all settings from first sensor.

Often the user may wish to report the readings directly in engineering units, rather than mV/V.

### **Conversion Method**

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.

Alternatively, range input provides a way to automatically calculate coefficient parameters given range values.

### **Units Conversion**

Units Type: Select from the list of available conversion types.

Input Units: Select the unit type matching sensor calibration sheet.

*Output Units:* Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

### **Display Format**

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.



**NOTE:** Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

### Save to File

Current sensor settings can be saved to a file for later retrieval.

### Load from File

Click this button to load previously saved sensor settings.

# 5.7 GAA2820 GEO ACOUSTIC AWARE LOGGER

### 5.7.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.* 

Model: Geo Acous Name: Geo Acous Installed Sensors:	tic Aware GAA28 tic Aware GAA28 1	20 Se 20 Fin Ma	ial Number: nware Version: x Sensor Num:	GA1987 v3.43		
Supported Features:	RSTAR Enab	led	rstar			. Therefore
Sampling						11.
Status:	LOGGING		Interval Ra	te: FIXED		30 T
Current Interval:	00 hours 15 min	utes 00 seconds	conds Logger settings update			
Start Time:	Wednesday, Sr	ptember 19, 2018, 0	4:45:00 PM	2010.00	210 10 44 22	
Current Time:	Wednesday, Se	ptember 26, 2018, 0	1:34:30 PM	2018/03	V13 16:44:32	
Estimated Fill Time:	Tuesday, Septe	mber 11, 2029, 09:0	0:00 PM			14 M
Battery		Board	Memory		🐥 Colori Data	The way
Voltage (Past, Present)	0.22 3.95	Rev: 1	Record Num	1958	Collect Data	
Battery Life: 138%		Temp: 23.7 °C	Num of fills:	0		Custom

Figure 5-55 – GAA2820 Status tab

### Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 12345). If it



does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

### Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

### Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.



**NOTE:** The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The GAA2820 Logger uses special long-life lithium batteries; contact RST for replacement part.

### Board

Board revision level is helpful for diagnostic purposes.

### Memory

Shows the current logger memory usage.

### **Collect Data**

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a \*.csv file. Please see section 0 for the \*.csv file format.



**NOTE:** When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a \*.csv file.

The current memory can also be erased by pressing the *Apply Settings* under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

### 5.7.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.



If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

Ring Down Count		ng Ly seriors		
10,696 RDC/h	r	<ul> <li>/ Interval (00.15.00</li> <li>/ Hour (RDC x 1hr/</li> </ul>	nterval) ar Count	
	Display Format	© Expotent	a	-11-
		History Graph		
			Activity	Nº W
			-	Custom

Figure 5-56 – GAA2820 Logger Monitor tab



**NOTE:** Until communication is established with the data logger, the program will display "-----" in Sensor Reading fields.



### **Graphical Monitor Historical**

The History Graph button invokes the data logger historical graph. The historical graph displays the recently downloaded file in a Sensor Reading vs. Time graph.

Historical Gra	ph						X
		2018/05/30 16:29:07	2018/05/30 16:43:48	2018/05/30 16:58:48	2018/05/30 17:13:48	2018/05/30 17:28:48	2018/05/30 17:43:48
r	Ń						
1500000							
1000000		-					
500000		. A		4			
	N	. YAA		مــــــرالــــــــــــــــــــــــــــــ	· · · · · · · · · · · · · · · · · · ·		

## Figure 5-57 – GAA2820 Logger Graphical monitor

The *Properties* menu option launches the Graphical Monitor Options dialog, which allows the user to manipulate the graph.

Properties	×
General Axis Graphs	
Coordinates range	
x1 = 🚺	y1 = -26328
x2 = 375	y2 = 1969664
Point marks	
Axis	
OK Cancel	Apply Help

Figure 5-58 – Historical graph properties



# 5.7.3 DATA VIEW

File: GAA3 Geo Acou Label: 1 Interval: 0 Sensor No	2820_0000000000000_2018 ustic Aware GAA2820 Geo Acoustic Aware GAA282 115:0 um: 1	80627_180324.c	S/N: Firmware: Status: Rate: Record Num	0000000000000 1.07 LOGGING FD/ED 375	Ele	
:	Date Time	Battery (V)	S 1 (RDC)		*	100 participation
32	2018/05/31 17:58:48	2.00	0			100
33	2018/06/01 15:04:32	2.00	2165			1998
34	2000/01/01 00:00:00	2.00	2594			10 mm
35	2018/06/01 15:13:48	2.00	31998			
36	2018/06/01 15:13:48	2.00	267			
37	2018/06/01 15:13:55	2.00	2516			a
38	2000/01/01 00:00:00	2.00	25074			
39	2018/06/01 15:28:48	2.00	309216			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
40	2018/06/01 15:43:48	2.00	426400			
41	2018/06/01 15:58:48	2.00	540288			
42	2018/06/01 16:13:48	2.00	1469312			- No
43	2018/06/01 16:28:48	2.00	1573504			
**	2019/06/01 16:43:49	2.00	1966752		Ŧ	Custom

The Data View tab allows quick preview of logger data files.

Figure 5-59 – GAA2820 Logger Data View tab



NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel<sup>™</sup>) to see entire file.



# 5.7.4 LOGGING

The Logging tab contains four main components: Interval, Logger Options, Clock Options and Logger Label.

Connections 🚮 Status 📰 Data View 💻 Monit Interval Hour 0 x Min 15 x Sec 0 x	or I Logging C Sensors Admin Recommended interval is 1hr (or optionally 15 mins) Logging Interval Logging Interval
(ii) Use Fixed Interval     Logger Options (24 Hour Time)     (iii) Sync To Interval (Midnight)     Use Start Time Hour 16 * Min 45 *     Start Now	Memory Options
Clock Options 26-Sep-18 Auto sync date / time Auto sync date / time	
Logger Label Geo Acoustic Aware GAA2820 Update Label	Set Custom Units
Status         Status Message           Image: Connected to GAA2820	USB Port # 9 Reconnect Connect to selected der Selected der only

## Figure 5-60 – GAA2820 Logging tab



**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

### Interval

This section is used to set the logging interval. Only *Fixed Interval* is available. Arrow buttons allow the user to scroll up or down pre-set values.

GAA2820 logger memory can hold 606,060 records.

### Logger Options

*Use Start Time:* A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.



If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

### **Clock Options**

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

### Logger Label

Custom label can be entered if desired.

### Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.



**NOTE:** During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

## 5.7.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.



Figure 5-61 – GAA2820 Logger Sensors tab



Geo Acoustic Aware Logger has one sensor.

### Advanced

This dialog allows customization of sensor gain, hysteresis, and masking. Any changes should be coordinated with RST Instruments support personnel.

Advanced GAA Setup	1	×
The advance	d GAA settings s RST Instrur	should not be changed without the assistance of ments Ltd technical personnel.
Gain	40	(20 to 60)
Hysteresis	66	(66 mV to 660 mV) Resistance 100000 Ohm
Mask	5000	(0 to 10000) 🔲 Auto Mask
		OK Cancel

### Figure 5-62 – GAA2820 Logger Advanced Sensors tab

### Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a \*.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the Apply Settings under the Logging tab. The program will prompt you to confirm the erasing of data from its memory.

### Save to File

Current sensor settings can be saved to a file for later retrieval.

### Load from File

Click this button to load previously saved sensor settings.



# 5.8 **DTSAA SHAPEARRAY LOGGER**

# 5.8.1 STATUS

The status tab contains five sections: Logger, Sampling, Battery, Board and Memory.

Logger Modet DT ShapeA Name: DT ShapeA Installed Segments: 2 Supported Features:	nay Logger DTSA nay Logger DTSA 1	A Ser A Fin Ma	ial Number: 1 nware Version: v x Segment Num: 2	23456 4.11 05		
Sampling Status: Current Interval:	LOG PENDING 12 hours 00 min	utes 00 seconds	Interval Rate:	FIXED		
Start Time: Current Time:	Saturday, July 1 Friday, July 17,	8, 2020, 12:00:00 A 2020, 01:50:04 PM	м	2020/07/17 12:50:09	don	9
Estimated Fill Time:	Saturday, Decer	nber 13, 2042, 11:00	00 PM			
Battery Voltage (Past, Present):	3.70 3.88	Board Rev: 2 Temp: 22.9 °C	Memory Record Num: Num of fills:	0 Cole	ect <u>D</u> ata	DTSAA
rt Status Status Mes	sage				Reconnect	Disconnect

Figure 5-63 – DTSAA Status tab

### Logger

The logger section provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, and features. Ensure that the serial number matches what is expected (in this example it is 123456). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

### Sampling

The sampling section shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

### Battery

The battery section displays the current battery voltage, the past battery voltage recorded when the sample was taken, and the estimated remaining battery life. To ensure uninterrupted operation, replace the battery when the estimated battery life is getting low. The battery indicator turns red when the estimated battery life is 20% or less.



NOTE: The "Battery Past" value depends on recorded data availability.



Refer to Section 8 for information about battery life and battery replacement. The DTSAA Logger uses special long-life lithium batteries. Contact RST for replacements.

### Board

The board section consists of the board revision level and board temperature. The board revision level is helpful for diagnostic purposes.

### Memory

The memory section displays the current logger's memory usage.

### **Collect Data Button**

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can then be used to download the data (a progress bar will be displayed) and automatically write it to a .dat file. Downloaded files are intended to be used with Measurand's SAA Suite software.



**NOTE:** When clicking on the *Collect Data* button, the program will provide the option to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected (and no parameters have been changed), it will download the current readings and all of the previous data to a file. The current memory can also be erased by pressing the *Apply Settings* under the *Logging* tab. The program will prompt you to confirm erasing the data.

## 5.8.2 MONITOR

Selecting the Monitor tab sets the data logger into monitor mode.



## Figure 5-64 – DTSAA Logger Monitor tab

Click Get Data to save current array values into .dat files.



### 5.8.3 LOGGING

The Logging tab contains four sections: *Interval, Logger Options, Clock Options* and *Logger Label.* 

DT Logger Host		
Interval Hour 12 _ Min 0 _ Sec 0 _	Mubi Interval	
Use Fixed Interval O Use Multi Interval Table (Adv	vanced)	(SSHAGE)
Logger Options (24 Hour Time) Sync To Interval (Midnight) Use Start Time Hour 0 * Min 0 * Start Now	Memory Options  Wrap on Memory Full (Overwrite Data)  Stop Logging when Memory Full	1
Clock Options		0
17-Jul-20		
Auto sync date / time	A STATE	
Logger Label		
DT ShapeArray Logger DTSAA Update Label	Apply Settings	
	<i>A</i> De	connect
Port Status Status Message	USB 15 Reconnect	ected device
Connected to DTSAA	Se Manual 🕜 Help <b>rsf</b>	ny Ext

Figure 5-65 – DTSAA Logging tab



**NOTE:** When clicking on the *Collect Data* button, the program will provide the option to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected (and no parameters have been changed), it will download the current readings and all of the previous data to a file.

### Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. To set the data logger to read at fixed intervals, select the "Use Fixed Interval" radio button and use the arrows on the Hour, Min, and Sec fields to scroll through pre-set values.

To set up the logger with multiple intervals, select the "Use Multi Interval Table (Advanced)" radio button. This will launch the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.



Multi Interva	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	12	0	5	10	5d 00h 00m 50s
Interval #2:	6	0	0	30	7d 12h 00m 00s
Interval #3:	0	30	0	80	1d 16h 00m 00s
Interval #4:	12	0	0	0	151455d 00h 00m 00s
Interval #5:	0	0	0	0	
Interval #6:	0	0	0	0	
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
Interval	0	0	0	0	
			Totals:	120	151469d 04h 00m 50s

## Figure 5-66 – Multi Interval table

The hour, minute, second, and number of iterations per interval must be specified.



**NOTE:** Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on the logger's hardware. The dialog features an Interval Fill Time field, which allows the user to see the exact time the interval iterations will be completed, relative to the start time of the interval. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

### Logger Options

*Use Start Time:* A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.



**NOTE:** If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e., for some time in the future, the *Status* on the bottom of the screen will read *Log Pending* until that interval is reached.

### **Memory Options**

This section has two options: *Wrap on Memory Full (Overwrite Data)* and *Stop Logging When Memory Full.* 



Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

### **Clock Options**

This section allows the user to set the date and time of the data logger. Pressing the *Sync* to *Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger's internal clock each time *Apply* button is pressed.

### Logger Label

A custom label for the logger can be entered, if desired.

### Apply Settings Button

After any changes have been made to the data logger's *Logging* screen, click on the *Apply Setting* button to save these changes, and upload them to the data logger's memory.



**NOTE:** During the logging settings upload, all existing logger data will be erased. Be sure to download any data on the logger prior to changing the logging settings. Sensor configurations will not be affected.

### 5.8.4 **DTSAA** TAB

The DTSAA is designed to discover ShapeArray sensors and configure the datalogger settings automatically.

### Array Segment Configuration

The DTSAA tab lists all of the segments in the array, along with the segment index, segment serial number, and segment type.

					To	tal Segment #	
			Serial	Type	A.	20	da ta
ShapeArray Discovery		1	350009	DôZ			
COLDiscover 3.4 Stop		2	350008	DAZ		Segment	_00/ yana
TUG Astays 👫 Discovery		3	350007	D0/Z		Innet	100 -
		4	350006	DôZ		Segment	12/ 19
		5	350005	D/MZ		Dalata	VIII AV
Detected 21 comments		6	350004	D0/Z		Segment	30 M
Detected 21 segments		7	350003	DAZ	10	Delete Al	10 . Date
out of 205 maximum.		8	350002	DAZ		Segments	
21 segments in group.		9	350001	D0/Z			3.5
Click Reconnect to load		10	350000	DôZ		A 11 - 11 - 1	2
apfiguration		11	350010	D0/Z		Upload to Upload to	20 20
configuration.		12	350011	D0/Z		- cogge	har
	A New	13	350012	12072		File	
	Copy 1	14	350013	12072	10-	Curata I	
Mag Sensor Present PReconnect	Incompany C.A.	10	350014	1212		File	
	_ increment 3/14	10	350015	1012			DTSAA
eg #: 21, 01 #: 1, Seg H 01 #: 21, Top F: 0.07		4.0	330016	1012			Select of the se
							1.

Figure 5-67 – DTSAA Segment Setup tab



### **Discover Arrays**

To discover ShapeArray sensor nodes, click on *Discover Arrays*. The logger will initiate a device reading to discover sensor nodes.

It will take about 10 seconds for the discovery status to be displayed. If a ShapeArray is correctly discovered, the logger will configure itself to log the discovered ShapeArray. Click the Reconnect button to load previously discovered arrays.



**NOTE:** Running *Discover Arrays* will reconfigure logging. Any previous data logged should be downloaded before using *Discover Arrays*.

#### Magnetometer sensors

To include magnetometer sensors, place a checkmark into the *Mag Sensor Present* checkbox.



**NOTE:** The segment list shows orientation segments only. Status segment and magnetometer sensors are not included in the list, but they will be written to logger configuration.

### New Copy

When adding subsequent segments to the array, click *New Copy*. Enter the desired number of copies to speed up the process.

#### Increment S/N

To help with adding segments with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.

The segment list can be modified using following controls:

#### Add Segment

To add another segment to the array, click the *Add Segment* button. The new segment will be added to the end of list.

#### Insert Segment

To insert a segment at the current position, click *Insert Segment*.

#### **Delete Segment**

Remove currently displayed segments from a logger configuration by clicking *Delete Segment*.

#### **Delete All Segments**

To remove all segments except first one, click Delete All Segments.

To update selected segment serial number, click on desired serial and type new value. *Upload to logger* 



As a reminder, whenever **ANY** changes are made under the Segments tab, the *Upload to Logger* button MUST be clicked to update the logger with new information.



**NOTE:** Before uploading sensor settings, the program will ask whether to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data. The current memory can also be erased by pressing the *Apply Settings* under the

Logging tab. The program will prompt you to confirm the erasing of data from its memory.

### Load from File

Click this button to load previously saved segment settings.

### Save to File

Current segment settings can be saved to a file for later retrieval.

# 6 DATA FILES (\*.CSV)

Whenever the *Collect Data* button is pressed under the *Status* tab, the software will collect all the current data stored in the memory of the data logger. A progress bar will be displayed showing the status of this collection.

The software will automatically write the data to a \*.csv file in the data directory. The default data directory is **My Documents\Multichannel.** Data directory can be changed using Data File Folder dialog box. The \*.csv file has the following format:

### <ID>\_serialnumber\_yymmdd\_hhmmss.csv

where <ID> prefix represents the instrument model (DT2011B, DT2055, DT2055B, DT2040, IC6656L, DTL201B-2B, IC6560, DT4205, DT2306, DT2350, DT2485, DTSAA).

The data file can then be opened directly with Microsoft Excel<sup>™</sup> or other spreadsheet programs. A new file will be created each time the data is collected. It is the user's responsibility to copy data into a single spreadsheet if desired.

# 6.1 VIBRATING WIRE LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:



	- • • • -  -	-										DT2055	_02899_20	130813_10	2812.csv	- Micro	soft Excel	-	_	_										■ X
Fil	e Home	Insert Pa	ge Layout	Form	ulas D	ata I	Review	View	Add-Ins	Tear	n																		۵ 🕜	- 🗗 🛛
-	🖁 🔏 Cut	Calibri		- 11 -	Δ	= _			Wrap Te	xt	Gener	al	Ŧ	1	1 1		Normal		Bad		Good			- 🌫		Σ Aut	toSum *	A7 8	n	
	Copy 🔹												* 0 . 00										· .			😺 Fill	-	Zu u		
Past *	e 🛷 Format Pai	nter B Z	Π·	8 *   🗸	•• <u>A</u> •	= =	-= 17		Merge 8	Center 1	\$ -	%,	.00 ⇒.0	Formatti	onai ⊧o ing ∗as T	able -	Neutral	(	Calculati	on	Check C	iell	₹ <sup>Ins</sup>	ent Delet	e Format	🖉 Cle	ar r	ilter * Se	lect 🔻	
	Clipboard	Gi .	Fon	t	G		A	lignment			i	Number	5					Style	s					Cell	5		Editi	ng		
	AB96	<b>+</b> (**	$f_{x}$	0																										~
	A	В	С	D	E	F	G	н	1	J	K	L	M	N	0	Р	Q	R	S	т	U	V	w	X	Y	Z	AA	AB	AC	AD =
1 N	lodel	DT2055 VW Mul	ti Channel I	ogger																										^
2 N	ame	Multi Channel V	W Logger D	T2055																										
3 5	erial Number	28	2 6-6	1 1 20 5																										
5 5	ampling Status	LOGGING	APPEND	11.50.5																										
6 S	ampling Rate	FIXED	/ur cito																											=
7 0	urrent Interval	0:05:	00																											
8 S	tart Time	12/08/20	13 17:36:5	3																										
9 C	urrent Time	13/08/20	13 10:28:1	2																										
10 N	umber Of Sensors		10																											
11 N	umber Of Records	21	03	-	•																									
12 5	ensor upload Num /		5 8020	0	0																									
14																														
15 T	MESTAMP	RECORD	BATTERY	VW 1	Therm 1	VW 2	Therm 2	VW 3	Therm 3	VW 4	Therm 4	VW 5	Therm 5				VW 1	Therm 1	VW 2	Therm 2	VW 3	Therm 3	VW 4	Therm 4	VW 5	Therm 5	LOGGER TE	RESET	USB	RSTAR
16																Unit Ty	e Pressure	Disabled	Pressure	Disabled	Pressure	Disabled	Disabled	Disabled	Disabled	Disabled				
17																Input U	nit MPa	Disabled	MPa	Disabled	MPa	Disabled	Disabled	Disabled	Disabled	Disabled				
18																Output	Un psi	Disabled	psi	Disabled	psi	Disabled	Disabled	Disabled	Disabled	Disabled				
19																Offset	0.00E+00	Disabled	0.00E+00	Disabled	0.00E+00	) Disabled	Disabled	Disabled	Disabled	Disabled				
20																Cal A=	-3.15E-09	9 Disabled	-3.65E-09	Disabled	-3.64E-09	Disabled	Disabled	Disabled	Disabled	Disabled				
21																Zero Ba	-5.08E-04	+ Disabled	-7.85E-04	Disabled	-7.93E-04	Disabled	Disabled	Disabled	Disabled	Disabled				
22																Temp(	4.00ETU	Disabled	Disabled	Disabled	7.42ETU	Disabled	Disabled	Disabled	Disabled	Disabled				
24																Temple	iti Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled				
25																Linked	h: Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled				
26																Sensor	BSweep	3K NTC	B Sweep	3K NTC	<b>B</b> Sweep	3K NTC	BSweep	3K NTC	B Sweep	3K NTC				
27 U	NITS->		Volts	psi	degC	psi	degC	psi	degC	B Units	degC	B Units	degC				B Units	Ohms	B Units	Ohms	B Units	Ohms	B Units	Ohms	B Units	Ohms	deg C			
28	12/08/2013 17:36		1 3.6	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	C	-109.09	9 (	-109.0	9			(	4.1E+07		4.1E+07	0	4.1E+07	C	4.1E+07	0	4.1E+07	23.2	0	(	0
29	12/08/2013 17:41		2 3.	4 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	0	-109.09	9 (	-109.0	9			(	0 4.1E+07	0	4.1E+07	0	0 4.1E+07	0	4.1E+07	0	4.1E+07	23	0	(	0
30	12/08/2013 17:46		3 3.	4 695.57	2 -109.09	1067.2	2 -109.09	1076.1	-109.09		-109.09		-109.0	9				J 4.1E+07		4.1E+07		0 4.1E+07	0	4.16+07	0	4.1E+07	23	0		0
22	12/08/2013 17:51		- D.	4 695.57	2 -109.09	1067.2	2 -109.05	1076.1	-109.09		-109.05		-109.0	9				4.16+07		4.15+07		4.107		4.10107	0	4.16+07	22.5	0		0
33	12/08/2013 18:01		6 3	4 695.57	2 -109.09	1067 2	2 -109.09	1076 1	-109.09		-109.09		-109.0	9				4.1E+07		4.1E+07		4.1E+07		4.1E+07	0	4.1E+07	22.9	0		0
34	12/08/2013 18:06		7 3.	4 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	0	-109.09	9 (	-109.0	9				0 4.1E+07		4.1E+07		4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	1	0
35	12/08/2013 18:11		8 3.	4 695.57	2 -109.09	1067.2	-109.09	1076.1	-109.09	0	-109.09	э (	-109.0	9			0	4.1E+07		4.1E+07	· · · ·	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	(	0
36	12/08/2013 18:16		9 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	c	-109.09	9 (	-109.0	9			0	4.1E+07		4.1E+07	. C	4.1E+07	c	4.1E+07	0	4.1E+07	22.8	0	(	0
37	12/08/2013 18:21		10 3.	4 695.57	2 -109.09	1067.2	2 -109.09	9 1076.13	7 -109.09	c	-109.09	9 (	-109.0	9			0	4.1E+07	· · ·	4.1E+07	0	4.1E+07	c	4.1E+07	0	4.1E+07	22.8	0		0
38	12/08/2013 18:26		1 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	0	-109.09	9 (	-109.0	9			0	0 4.1E+07		4.1E+07	0	0 4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	(	0
39	12/08/2013 18:31		12 3.	4 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	0	-109.09	9 (	-109.0	9			0	0 4.1E+07		4.1E+07	(	0 4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0		0
40	12/08/2013 18:36		14 22	5 695 57	2 -109.09	1067.2	-109.05	1076.1	-109.09		-109.05	, I	-109.0	9				4 16+07		4 15+07		4.15+07		4.15+07	0	4.15+07	22.7	0		0
42	12/08/2013 18:46		15 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	-109.09	0	-109.09	3 1	-109.0	9				0 4.1E+07		4.1E+07		4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	1	0
43	12/08/2013 18:51		16 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	c	-109.09	9 0	-109.0	9				0 4.1E+07	· .	4.1E+07	6	0 4.1E+07	c	4.1E+07	0	4.1E+07	22.7	0	i i	0
44	12/08/2013 18:56		17 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	-109.09	0	-109.09	э (	-109.0	9			0	4.1E+07		4.1E+07	· · · ·	4.1E+07	c	4.1E+07	0	4.1E+07	22.6	0	(	0
45	12/08/2013 19:01		18 3.3	5 695.57	2 -109.09	1067.2	-109.09	1076.1	-109.09	0	-109.09	9 (	-109.0	9			0	4.1E+07	0	4.1E+07	0	4.1E+07	C	4.1E+07	0	4.1E+07	22.6	0	(	0
46	12/08/2013 19:06	i	19 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	9 1076.13	7 -109.09	C	-109.09	9 (	-109.0	9			0	4.1E+07	· · ·	4.1E+07	0	4.1E+07	c	4.1E+07	0	4.1E+07	22.6	0		0
47	12/08/2013 19:11		20 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	7 -109.09	C	-109.09	9 (	-109.0	9			0	0 4.1E+07	C	4.1E+07	0	0 4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0		0
48	12/08/2013 19:16		(1 3.3	5 695.57	2 -109.09	1067.2	2 -109.09	1076.1	-109.09	0	-109.09	, ,	-109.0	9				4.1E+07		4.1E+07		4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	-	v
14 4	▶ ▶ DT2055	02899_201	30813_1	02812	2																									▶ [
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Figure 6-1 – Vibrating Wire logger sample data file



**NOTE:** When sensor reading is outside of the valid range, the "99999" value will be recorded as the Eng Units and B Units data.



# 6.2 4 TO 20MA LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:

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1	Name	MultiChappel	818 420mA	Multi Cha	nnei Logg	er																		
2	Serial Number	Multichannel	1 420MA LC	igger D142	05																			
4	Firmware Version	1	Software	1 39 9																				
5	Sampling Status	LOG PENDING	oontarare	1.00.0																				
6	Sampling Rate	FIXED																						
7	Current Interval	0:00:20	)																					
8	Start Time	05/11/2014	12:54:34																					=
9	Current Time	05/11/2014	12:31:23	3																				
10	Number Of Senso	6																						
11	Number Of Recor	110	)																					
12	Sensor Upload N	8	482022	2 8A00																				
13																								
14																								
15	TIMESTAMP	RECORD	BATTERY	420mA 1	Therm 1	420mA 2	Therm 2	420 Sense	TH Sensor				420mA 1	Therm 1	420mA 2	Therm 2	420 Senso	TH Senso	LOGGER T	RESET	USB	RSTAR	STATUS	
16												Unit Type	Disable	d Disabled	Pressure	Disabled	Distance	Disabled						
17												Input Uni	Disable	d Disabled	k Pa	Disabled	mm	Disabled						
18												Output Ur	Disable	d Disabled	kPa	Disabled	mm	Disabled						
19												Offset	Disable	Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
20												Lower Res	Disable	Disabled	1.005+00	Disabled	1.00E+00	Disabled						
21												Upper Re	Disable	Disabled	0.005+00	Disabled	1.000000	Disabled						
22												Lioner En	Disable	d Disabled	1 0.00E+00	Disabled	1.00E+00	Disabled						
24												Linear Mi	Disable	d Disabled	2.00E+00	Disabled	3.00E+00	Disabled						
25												Linear Ze	Disable	d Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
26												Temp CF	Disable	d Disabled	Disabled	Disabled	Disabled	Disabled						
27												Temp Init	Disable	d Disabled	Disabled	Disabled	Disabled	Disabled						
28												Linked Ch	Disable	d Disabled	Disabled	Disabled	Disabled	Disabled						
29												Sensor	420mA	10K NTC	420mA	10K NTC	420mA	10K NTC						
30	UNITS->		Volts	mA	deg C	kPa	deg C	mm	deg C				mA	Ohms	mA	Ohms	mA	Ohms	deg C					
31	05/11/2014 12:54	1	. 2	4.028738	21.99	8.057	22.02	12.086	22.03				-4.0287	4 11413.29	-4.02874	11400.96	-4.02874	11391.72	22.3		1	1 0	11	
32	05/11/2014 12:54	2	2	4.028738	22.04	8.057	22.05	12.086	22.06				-4.0287	11390.18	-4.02874	11382.48	-4.02874	11377.87	22.3	(	נ נ	1 0	11	
33	05/11/2014 12:55	3	2	4.028738	22.02	8.057	22.03	12.086	22.05				-4.0287	11399.42	-4.02874	11391.72	-4.02874	11382.48	22.3		1 1	1 0	11	I
34	05/11/2014 12:55	4	2	4.028738	22.01	8.057	22.03	12.086	22.04				-4.0287	11404.04	-4.02874	11394.79	-4.02874	11388.64	22.3	(	1	1 0	11	I
35	05/11/2014 12:55	5	2	4.028738	21.99	8.057	22	12.086	22.01				-4.0287	11413.29	-4.02874	11408.66	-4.02874	11402.5	22.3		1	1 0	11	
36	05/11/2014 12:56	6	2	4.028738	21.98	8.057	22	12.086	22.03				-4.0287	+ 11417.92	-4.02874	11408.66	-4.02874	11396.33	22.3			1 0	11	
32	05/11/2014 12:56	/	2	4.028/38	22.02	8.057	22.04	12.085	22.06				-4.0287	+ 11400.96	-4.02874	11396.22	-4.02874	11388.64	22.3		, 1 n	1 0	11	
30	05/11/2014 12:50	0	2	4.028738	22 22 02	8.057	22.05	12.080	22.04				-4 0287	11399.42	-4.02874	11391 72	-4.02874	11384.02	22.5		1	1 0	11	
40	05/11/2014 12:57	10	2	4.028738	22.02	8.057	22.05	12.000	22.05				-4.0287	11387.1	-4.02874	11376.34	-4.02874	11368.66	22.3		3	1 0	11	
41	05/11/2014 12:57	11	2	4.028738	22.06	8.057	22,07	12.086	22.09				-4.0287	11380 95	-4.02874	11371 73	-4.02874	11364.05	22.3		3	1 0	11	
42	05/11/2014 12:58	12	2	4.028738	22.05	8.057	22.06	12.086	22.08				-4.0287	11384.02	-4.02874	11377.87	-4.02874	11370.19	22.3		3	1 0	11	
43	05/11/2014 12:58	13	2	4.028738	22.04	8.057	22.06	12.086	22.07				-4.0287	11390.18	-4.02874	11380.95	-4.02874	11374.8	22.3	(	3	1 0	11	
44	05/11/2014 12:58	14	2	4.028738	22.03	8.057	22.04	12.086	22.06				-4.0287	11394.79	-4.02874	11387.1	-4.02874	11380.95	22.3	(	נ נ	1 0	11	
14	4 B B DT4205		000000	2014110	5 200	0.057	22.05	10.000	22.00				4.0007		4	112204.02	4.03074	44077.07	22.2					
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Figure 6-2 – 4 to 20mA Logger sample data file



**NOTE:** When sensor reading is outside of the valid range, the "99999" value will be recorded as the Eng Units and mA Units data.



# 6.3 TILT LOGGER SAMPLE DATA FILE

### The following is how the data appears in Excel:

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1 Model	IC6656L Tilt Loge	ger		-							_			-Â
2 Name	Tilt Logger													
3 Serial Number	5018													
4 Firmware Version	1.03	Software Version	1.39.2											
5 Sampling Status	LOGGING	APPEND												
6 Sampling Rate	FIXED													
7 Current Interval	0:00:05													
8 Start Time	28/11/2013	17:52:16												
9 Current Time	28/11/2013	18:13:53												
10 Number Of Sensor	2													
11 Number Of Record	960													
12 Sensor Upload Nur	11	8	0											
13														
14														
15 TIMESTAMP	RECORD	BATTERY	Tilt 1	Tilt 2				Tilt 1	Tilt 2	LOGGER T	RESET	USB	RSTAR	
16							Unit Type	Custom	Distance					
17							Input Unit	mm/m	mm					
18							Output Ur	mm/m	mm					
19							Offset	0.00E+00	0.00E+00					
20							Cal A =	1.00E+00	1.45E+00					
21							Zero B =	0.00E+00	8.80E-01					
22							Cal C =	Disabled	Disabled					
23							Temp CF	Disabled	Disabled					
24							Temp Init	Disabled	Disabled					
25							Linked Ch	Disabled	Disabled					
26							Sensor	15 degree	15 degree	s				
27 UNITS->		Volts	cm	mm				sin(angle)	sin(angle)	deg C				
28 28/11/2013 17:52	1	3.71	14.66	1.228				-0.01466	0.032997	23.3	0	C	0	
29 28/11/2013 17:52	2	3.71	14.658	1.228				-0.01466	0.032986	23.3	0	C	0	
30 28/11/2013 17:52	3	3.71	14.668	1.228				-0.01467	0.032984	23.3	0	C	0	
31 28/11/2013 17:52	4	3.71	14.734	1.228				-0.01473	0.032967	23.3	0	C	0	
32 28/11/2013 17:52	5	3.71	14.748	1.228				-0.01475	0.032955	23.3	0	C	0	
33 28/11/2013 17:52	6	3.71	14.729	1.228				-0.01473	0.032963	23.3	0	C	0	
34 28/11/2013 17:52	7	3.71	14.753	1.228				-0.01475	0.032961	23.4	L 0	C	0	
35 28/11/2013 17:52	8	3.71	14.75	1.228				-0.01475	0.032955	23.3	0	C	0	
36 28/11/2013 17:52	9	3.71	14.732	1.228				-0.01473	0.032959	23.4	L 0	C	0	
37 28/11/2013 17:53	10	3.71	14.736	1.228				-0.01474	0.032969	23.4	L 0	C	0	
38 28/11/2013 17:53	11	3.71	14.742	1.228				-0.01474	0.032957	23.4	0	C	0	
29 28/11/2012 17:52	12 anual 2013112	8 181353	1/1 729	1 228			14	-0.01/173	0.032963	23 /	0			▼ ► []
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Figure 6-3 – Tilt Logger sample data file



# 6.4 **DT2485 LOGGER SAMPLE DATA FILE**

The following is how the data appears in Excel:

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	А	В	С	D	E	F	G	Н	- I	J	К	L	М	N
1	Model	DT2485 IPI Lo	ogger											
2	Name	IPI Logger DT	2485											
3	Serial Number	6152												
4	Firmware Version	3.45	Software	1.13.4										
5	Sampling Status	LOG PENDING	G											
6	Sampling Rate	FIXED												
7	Current Interval	0:10:00												
8	Start Time	09/05/2017	10:55:10		47/05/0517	40.00.00								
9	Current Time	1//05/201/	18:04:02	Logger II	1//05/201/	18:02:42								
10	Number Of Sensors	14												
11	Number Of Records	53	USB											
12	Sensor Upload Num / S	90	888C6A26	5548008	211/0			WD 2	PO 40	EXT 39	BO 255	SW 0	PDI 26	
13														
14	TIMESTAND	DECORD	DATTERV	Uninvial		IDIT 1	The res Ar	ThermAr	TheresAre	ThermAr	The sea A s	TheresAre	ThermAr	ThermArr
15	THVESTAWP	RECORD	DATTERT	Uniaxiai	IPID I	1P11 1	Therman	o Therman	merman	10	11	Therman 10	12	
10				0	0	0		8	9	10	11	12	15	14
10														
10														
20														
20														
21														
22														
20														
25														
26	UNITS->		Volts	deg	sin(angle)	deg C	deg C	deg C	deg C	deg C	deg C	deg C	deg C	deg C
27	09/05/2017 10:55	1	3.3	-15.718	-0.000368	21.42	20.97	21.09	21.34	21.38	21.4	21.38	21.52	21.58
28	09/05/2017 11:05	2	3.24	-15.74	-0.000366	21.62	20.98	21.12	21.38	21.43	21.45	21.43	21.58	21.64
29	09/05/2017 11:15	3	3.15	-15.377	-0.000366	21.85	21.02	21.16	21.43	21.49	21.51	21.49	21.64	21.71
30	09/05/2017 11:25	4	3.17	-15.528	-0.000366	21.9	21.05	21.19	21.48	21.54	21.56	21.55	21.7	21.77
31	09/05/2017 11:35	5	3.18	-15.584	-0.000368	21.87	21.07	21.22	21.51	21.58	21.61	21.6	21.76	21.82
32	09/05/2017 11:45	6	3.18	-15.723	-0.000364	22.04	21.09	21.24	21.54	21.61	21.64	21.63	21.8	21.87
33	09/05/2017 11:55	7	3.18	-15.593	-0.000364	21.78	21.12	21.27	21.57	21.64	21.68	21.66	21.84	21.91
34	09/05/2017 12:05	8	3.18	-15.543	-0.000366	21.75	21.14	21.28	21.56	21.62	21.66	21.64	21.8	21.83
35	09/05/2017 12:15	9	3.18	-15.721	-0.000366	21.93	21.15	21.29	21.58	21.65	21.68	21.66	21.83	21.88 💌
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Figure 6-4 – DT2485 Logger sample data file



# 7 WIRELESS COMMUNICATION SETTINGS

RST wireless enabled data loggers can be set up to use one of the following modes:

- DT Link Wireless
- RSTAR System

Wireless mode configuration starts in Wireless Settings dialog.

Wireless Settings					<u> </u>
<ul> <li>None</li> <li>RSTAR</li> <li>DTLink</li> </ul>	Set	DTLink Settings			
DTLink enabled.				E	dt

Figure 7-1 – Wireless settings dialog

Depending on selected mode, appropriate controls enable further system configuration.

Refer to section 7.1 for RSTAR System configuration, or section 7.2 for DT Link setup instructions.

# 7.1 **RSTAR ARRAY RADIO SERIES CONFIGURATION**

The RSTAR Array Radio Series use wireless technology to provide continuous data acquisition. The RSTAR Node uses the same star topology at the sensor level with a continuously active RTU hub which is accessible via ModBus RTU commands from an RTU Hub interfaced to a FlexDAQ data logger. It is based on the 900 MHz, 868 MHz and 2.4 GHz spread spectrum band (country dependent) with extensive open-country range through use of a simple dipole antenna. A complete RSTAR System is packet-oriented and consists of RSTAR nodes (slaves) and an RTU Hub (master). The RSTAR nodes wake from low-power sleep and collect data from their attached sensors, such as RST's Vibrating Wire Piezometers. This data, which includes module address, hub address, sensor module serial number, diagnostics, data, and CRC check, is then sent (wirelessly) as a packet to the RTU Hub. Upon reception to the FlexDAQ, the RTU Hub will issue an ACK signal which may include clock synchronization and rate data. The RTU Hub stores the data in a temporary register set which is overwritten as new data is received; there is an intermediate data logging function in the RSTAR Node. The data logger within the FlexDAQ has ultimate responsibility for logging data.











Figure 7-3 – RSTAR-equipped data loggers

Figure 7-4 – RTU hub

A FlexDAQ enclosure shown with an open lid to reveal an installed RSTAR RTU Hub (on DIN rail), data logger, radio, and power supply.


Figure 7-5 – FlexDAQ enclosure

When DT Logger Host software connects to RSTAR compatible device, the RSTAR Setup dialog is accessible from Wireless dialog in Connections tab.

RSTAR Setup	
RSTAR Enabled Disable RSTAR Sync Synced	Device Settings XBee Base Serial Num 0013A200 40AF960E XBee Data ID 4954 Enable Edit Advanced Update
RRSIL 71 RRSIB 71 Sync	TX Slot 4 Data RF Frequency 900MHz Encryption
StopLoggerBaseRSSI7271	Module Type HP900 Car
1,V,31,31,RSSI,72,71,ER,0,0,GD,7,42,TF	R,1,13,EA,3,52,EC,0,0,T,2

Figure 7-6 – RSTAR setup dialog





**NOTE:** RST data loggers shipped as part of RSTAR system have all settings preconfigured. It is strongly recommended to contact RST personnel before modifying any RSTAR settings.

The RSTAR can be enabled or disabled on each logger.

#### Sync

Force a synchronisation with an RTU hub. If an RTU hub is found, the logger settings are updated from an RTU. Connection signal strength is displayed after successful update.

#### Ping

Send ping commands to an RTU hub. The RTU hub is pooled every few seconds and connection details are shown in real time. The quality of radio connection can be determined from given data.

#### **Device Settings**

Every logger in RSTAR system needs to be set up with one RTU base hub. The RTU hub Serial Number and Data ID tells the logger which RTU hub to connect to. These settings are password protected to protect system integrity.

#### Advanced Settings

Adjustment of other device settings can be performed with assistance of RST Instruments personnel. The Advanced Settings dialog can be used to display various system settings. Use *Query Logger* button to show system status.

RSTAR Advanced			×
Query successfu	l	↓ Query Logger	
Parameters		Counters	
XBee Network ID	7FFE	TX Retry Count 17226	
Preamble	00	TX Pac Decode Err Cnt 0	
Unicast Retry Num	01	TX Pac Err Cnt 0	]
Power Level	04	TX 2nd Slot Retry 254	
Character Time Out	0A	Clear	
API Mode	01		
Network Delay Slots	03	TX Slot Retry 105	
Multi Transmit	02	Power Pulse On	
Net Hops	01	Hardware Ver 35.66	
API RX Ind	00	Firmware Ver 16.10	
TX Options	40	Module Encryption	
Frequencies	See Freq	Lock	
		Valid Key 1 Refresh	
		Invalid Key Count 0	]
	đ	Frequencies Cogger	Exit

Figure 7-7 – RSTAR advanced settings dialog





**NOTE:** When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Connections     A Status     Data View     Data View     Moni      Interval     Hour     0     x     Min     20     x     Sec     0     x     (     0     Use Fixed Interval     O     Use Multi Interval Table (Ad	Multi Interval Warced)	
Logger Options (24 Hour Time) Sync To Interval Use Start Time Hour 15 * Min 41 * Start On Update Clock Options December-13-16 * 2:00.52 PM Auto sync date / time Sync to computer date / time	Memory Options Wrap on Memory Full (Overwrite Data) Stop Logging when Memory Full	
Logger Label VW/IPI Logger DT2033 Update Label	Set Custom	DT2033
Port Status Status Message           O         G         Connected to DT2033	USB Pot # 68 Reconnect	Connect to selected devi only

Figure 7-8 – Settings disabled in RSTAR active mode

Consult the RSTAR manual (ELM0077) for detailed sample data and sample calibration information.

### 7.2 **DT LINK CONFIGURATION**

The DT Link use wireless technology to provide on demand data acquisition. It is based on the 900 MHz, 868 MHz and 2.4 GHz spread spectrum band (country dependent) with extensive open-country range through use of a simple dipole antenna. DT Link System is packet-oriented and consists of DT Link enabled logger and an DT Link Hub.

When DT Logger Host software connects to DT Link capable device, the DT Link Setup dialog is accessible from Wireless dialog in Connections tab.



Wireless Settings				×
© None © RSTAR S @ DTLink DTLink enabled.	Set OF LINK WIRELESS	DTLink Settings		
			Use local status cache	
			<b>V</b> Compress data	Exit

Figure 7-9 – Logger wireless settings dialog

#### Use local status cache

After successful connection, current logger settings will be saved in local cache file. Enabling local cache will decrease subsequent connections time.

#### **Compress Data**

Data compression decrease data download time.

DTLink Logger Settings		_	×
Device Settings			
DTLink Hub Address	0013A200	40C63582	
DTLink Logger Address	0013A200	40CE2AF9	
Network ID	6000		👍 Update
Preamble	0		- Logger
Power Level	4		
RF Frequency 900MHz Data Encryption Module Type HP900 200k Canada HP900 200k USA/Canada			
Defaults Exit			

### Figure 7-10 – DT Link logger settings dialog

All loggers belonging to the same network need the same Hub Address and Network ID. Advanced settings are for tuning up communication parameters.

Query suc	ccessful	L Query	Awake Time	60
		<ul> <li>Logger</li> </ul>	Sleep Time	15
ID = 6000	DL = 40C63582	D8 = 01	Idle Awake Tin	ne 100
HP = 00	TO = 40	D9 = 04	Idle Sleep Time	
RR = 02	EE = 00	P0 = 04	Idle Cude Num	600
MT = 03	RO = E6	P1 = 04	Tue Cycle Nun	000
PL = 04	AP = 00	P2 = 04	Connect Num	65
CM = 00FFFFFFE00000000	AO = 00	PR = 4000	Connect Time	2015/05/28 14:08:52
AF = 00FFFFFFFFFFFFFFFFF	D0 = 04	SM = 01	Connect Span D:H	H:M:S 0:4:8:32
MF = 19	D1 = 04	SO = 0136		
CE = 02	D2 = 04	SP = 000064		
NH = 07	D3 = 04	ST = 002710		V Save
NN = 03	D4 = 04	VR = 00008071		
SH = 0013A200	D5 = 04	HV = 00002346		Cancel
SL = 40CE2AF9	D6 = 04	DD = 12345678		
DH = 0013A200	D7 = 04	CT = 0032		
Module	: Encryption			
	Module Valid Key	Refresh		
See Freq	Lock Invalid Key Count			

#### Figure 7-11 – DT Link logger settings dialog

Click Query Logger to retrieve all parameters.



**NOTE:** RST data loggers shipped as part of DT Link system have all settings preconfigured. It is strongly recommended to contact RST personnel before modifying any DT Link settings.

The DT Link can be enabled or disabled on each logger.

### 8 **BATTERIES**

#### 8.1 **BATTERY DEFINITIONS**

Two kinds of batteries are used across the DT Logger range of products: standard and compact. They are summarized in Table 8-1.

Table	8-1 –	Battery	definitions
-------	-------	---------	-------------

Battery Name	Standard Battery	Compact Battery
Battery Type	SAFT LSH 20 D-cell	One SAFT LSH 14 light C-cell
		Or
		Two SAFT LS 14500 AA

Standard batteries are defined as SAFT LSH 20 D-cell batteries and can be placed directly into the battery holder inside the logger. Standard batteries are recommended for radio-equipped models but may be used with non-radio loggers.



Compact batteries are defined as either one SAFT LSH 14 light C-cell battery or two SAFT LS 14500 AA batteries and require the use of the appropriate adaptor prior to placement in the battery holder. Compact batteries are recommended for stand-alone loggers. Both compact battery options are designed to support the same level of performance in DT loggers and are considered equivalent.

# 8.2 MONITORING REMAINING BATTERY LIFE

To determine the remaining battery life, connect the DT Logger to a computer or Field PC with a USB cable and launch the DT Logger Host program. Once the software connects to the logger, the status of the battery, including the voltage and current battery life, is displayed (highlighted in the red box in Figure 8-1).

DT Logger Host		×
< Connections 🏠 Status 🛅 Data	View 📃 Monitor 🗐 Logging 💭 Sensors	Admin
Logger Modet DT2011B ELE08108 VW Single CH Name: Single Channel VW Logger DT201 Installed Sensors: 2 Supported Features:	annel Serial Number: 10860 IB Firmware Version: v3.26 Max Sensor Num: 2	
Sampling Status: LOG PENDING Current Interval: 01 hours 00 minutes Start Time: Tuesday, January 23 Current Time: Tuesday, January 23 Estimated Fill Time: >30 Years	Interval Rate:         FD/ED           00 seconds         Logger settings updated on:           , 2019, 12:00:00 PM         2019/01/29 10:57:25           , 2019, 11:59:26 AM         2019/01/29 10:57:25	
Battery Voltage (Past, Present): 3.60 3.69 R Battery Life: 100% To	oard Memory ev: 3 Record Num: 0 Collect Data emp: 19.9 °C Num of fills: 0	Custom
Port Status Status Message	USB Pot # 10 Reconnec 2011B	t Connect to selected device only Ext

### Figure 8-1 – Battery status on DT Logger Host

**WARNING:** When operating at lower than 0°C or higher than +40°C, the capacity of the lithium battery will decrease. The Battery Life indicator on DT Logger Host may overestimate the remaining battery life at temperatures outside this range.



NOTE: Batteries should be replaced when the Battery Life estimates there is less than 20%

# 8.3 BATTERY LIFE ESTIMATIONS IN DATA LOGGERS

The DT series loggers are purpose built with the battery capacities required to support static applications over a long period of time. Readings should be taken at a rate of once

every hour or longer. The reading interval can be set to less than an hour, but this will significantly decrease overall battery life. Table 8-2 details estimates battery life for DT data loggers set at 1-hour, 10-minute and 1-minute reading intervals in typical operating environments.

See Section 8.1 for definitions of standard and compact batteries.



Data Logger Configuration	Reading Interval	Radio	Compact battery	Standard battery
DT2011B, 1 VW/thermistor pair	1 hour	none	4 years	4 years
		RSTAR	n/a	4 years
		DT Link	n/a	4 years
	10 minutes	none	4 years	4 years
		RSTAR	n/a	2 years
		DT Link	n/a	3 years
	1 minute	none	6.5 months	2 years
		RSTAR	n/a	2.5 months
		DT Link	n/a	1 year
DT2055B, 5 VW/thermistor pairs	1 hour	none	4 years	4 years
		RSTAR	n/a	4 years
		DT Link	n/a	3.5 years
	10 minutes	none	1 year	3.5 years
		RSTAR	n/a	1.5 years
		DT Link	n/a	2 years
	1 minute	none	1 month	4.5 months
		RSTAR	n/a	2 months
		DT Link	n/a	4 months
DT2040, 20 VW/thermistor pairs	1 hour	none	1.5 years	4 vears
		RSTAR	n/a	3 years
		DT Link	n/a	2 years
	10 minutes	none	3 months	1 year
		RSTAR	n/a	6.5 months
		DT Link	n/a	9.5 months
	1 minute	none	10 days	1 month
	1 minuto	RSTAR	n/a	19 days
		DT Link	n/a	1 month
DT2485. 3 IPIs	1 hour	none	n/a	4 vears
		RSTAR	n/a	4 years
		DT Link	n/a	2.5 years
	10 minutes	none	n/a	12 months
		RSTAR	n/a	10 months
		DT Link	n/a	9.5 months
*1-minute reading intervals are	1 minute*	none	n/a	46 days
not recommended due to high		RSTAR	n/a	39 days
power requirements.		DT Link	n/a	44 days
DT2485_10 IPIs	1 hour	None	n/a	2 years
D12400; 10 II 13	Thou	RSTAR	n/a	1 5 years
		DT Link	n/a	1 year
	10 minutes	None	n/a	4 months
	To minuted	RSTAR	n/a	3.5 months
		DT Link	n/a	3.5 months
*1-minute reading intervals are	1 minute*	None	n/a	16 days
not recommended due to high	1 mmute	PSTAR	n/a	14 days
power requirements.		DT Link	n/a	15 days
	1 h a		11/a	7.5 months
U12400, 30 IPIS	i nour	none	11/d	
1 minuto roading intervale are not		NUT	n/a	/ months
recommended due to the reading	10 minute -		n/a	0.0 MONTINS
rate (approximately 90 seconds)	10 minutes	none	n/a	1 month
and high-power requirements		RSTAR	n/a	1 month
and high-power requirements.		DILINK	n/a	1 month

Table 8-2 – Battery life estimations



Data Logger Configuration	Reading Interval	Radio	Compact battery	Standard battery
DTSAA, 10 Segments	1 hour	None	n/a	5 years
-		RSTAR	n/a	5 years
		DT Link	n/a	n/a
*1-minute reading intervals are	10 minutes	None	n/a	5 years
not recommended due to high		RSTAR	n/a	3.8 years
power requirements.		DT Link	n/a	n/a
DTSAA, 50 Segments	1 hour	None	n/a	5 years
		RSTAR	n/a	5 years
		DT Link	n/a	n/a
*1-minute reading intervals are	10 minutes	None	n/a	2.6 years
not recommended due to high		RSTAR	n/a	1.3 years
power requirements.		DT Link	n/a	n/a
DTSAA, 100 Segments	1 hour	None	n/a	5 years
		RSTAR	n/a	3.4 years
		DT Link	n/a	n/a
*1-minute reading intervals are	10 minutes	None	n/a	9 months
not recommended due to high		RSTAR	n/a	7 months
power requirements.		DT Link	n/a	n/a
DTSAA, 200 Segments	1 hour	None	n/a	1.5 years
		RSTAR	n/a	1.2 years
		DT Link	n/a	n/a
*1-minute reading intervals are	10 minutes	None	n/a	2 months
not recommended due to high		RSTAR	n/a	2 months
power requirements.		DT Link	n/a	n/a
DTL201B, DTL202B	1 hour	none	n/a	4 years
		RSTAR	n/a	4 years
		DT Link	n/a	2.5 years
	10 minutes	none	n/a	1 year
		RSTAR	n/a	1 year
		DT Link	n/a	1 year
	1 minute	none	n/a	1.5 months
		RSTAR	n/a	1 month
		DT Link	n/a	1.5 months
DT4205*	1 hour	none	n/a	3.6 years
*Estimations heavily depend on		RSTAR	n/a	3.4 years
the number of sensors and the		DT Link	n/a	2.4 years
conditions under which the logger	10 minutes	none	n/a	7 months
operates. These estimations are		RSTAR	n/a	7 months
based on 10 sensors (5 4-20 mA		DT Link	n/a	7 months
sensors and 5 thermistors) with a	1 minute	none	n/a	23 days
4-20 mA sensor reading time of 4		RSTAR	n/a	21 days
current of 12mA at 24°C		DT Link	n/a	23 days
DT2306 18 potentiometers	Same performance c	DT2055 /	nr hetter	I
DT2350, 2 load calle	Same performance a	DT2000, 0	n bottor	
D12000, 2 10au 08115		$13 \nu 12000, 0$		

Given that battery life is dependent on a number of different variables, battery life can vary from the values shown in Table 8-2.

It is important to note that:

- This table is intended as a guideline. Battery life is best monitored via DT Logger Host (see Section 8.2).
- The values in Table 8-2 are interpolations based on laboratory measurements.





- Standard batteries are recommended for loggers equipped with RSTAR and DT Link.
- Compact batteries should be used for non-radio loggers only.
- The best battery performance will be observed in a typical environment, with temperatures between 0°C and +40°C. Loggers operating outside of this range will experience reduced battery capacity and decreased battery life.

### 8.4 CURRENT DT LOGGER AND GAA2820 BATTERY REPLACEMENT INSTRUCTIONS

This section outlines the battery replacement procedure for current DT loggers and the GAA2820. Current DT loggers are DT2011B, DT2055B, DT2040, DT4205, DT201B, DT202B, DT2306, DT2485, DT2350, and DTSAA.

The following steps outline the battery replacement procedure:



**CAUTION:** Prior to beginning the replacement procedure, ensure that the correct batteries are being used. Standard batteries are highly recommended with wireless (i.e. RSTAR and DT Link) loggers. Compact batteries will not work with wireless loggers.

- 1. Connect to the data logger via the USB cable and download the data.
- 2. Disconnect the logger from the computer and remove the top cover (4 Phillips screws).
- 3. Lift the battery from the negative terminal and remove the battery from the carrier. Replace it with a new one, maintaining the correct polarity.



**NOTE:** Data loggers powered by compact batteries will house batteries in an adapter, which sits in the battery carrier. Remove the adapter before removing the batteries. Place new batteries into the adapter, then place the adapter into the carrier in the logger.

- 4. Replace the logger's lid.
- 5. Connect the logger to the PC again and navigate to the *Connections* screen. Click on *Advanced* button and then on *Initialize Battery*.
- 6. Switch to the *Logging* screen. Verify that the settings are correct and press the *Apply Settings* button. You must press *Apply Settings* to reset the data logger regardless of whether any parameters have been changed.



**CAUTION:** When replacing the batteries, it is important to connect to the data logger and re-apply the data logger logging settings. This re-initializes the data logger and ensures that the time settings are correct. Failure to do this could result in improper time stamps after the batteries are replaced.



# **9 TROUBLESHOOTING**

### 9.1 **CONNECTION PROBLEMS**

Upon launching, DT Logger Host, software will try to connect to the logger using current communication settings. Once connected, the port and status indicators turn green and the *Status* screen should display logger information.

The connection status is displayed on status bar. If the connection fails (status indicators are red or yellow, or status screen shows no status data), take note of the message and number displayed, then find the corresponding description in Table 9-1.

Port not open: The communication port is being used by some other application. Solution: Close other windows applications that might be using serial port assigned to the Logger. Select the correct logger type using logger mode buttons.

- Connecting to the logger message continuously displayed. Solution: Verify that the communication cable is connected and connections are tight. Replace logger batteries with fresh set.
- 2. State Errors, Reading Errors, Memory Read Errors. Solution: Check the battery status on the *Status* screen on DT Logger Host; replace if necessary. Check cable for damage. Replace communication cable if in doubt.

### 9.2 SOFTWARE STABILITY

The DT Logger Host real time readout relies on continuous data transmission over serial communication port. This transmission may be occasionally interrupted by other computer activity resulting with program freezing or displaying erroneous data. If this happens, DT Logger Host needs to be closed down and restarted. Check battery state regularly, as a drained battery might cause data transmission errors. Always close software when changing loggers or reconnecting serial communication cable.

#### **Data Collection Help**

In case of accidental data loss, the Memory Dump feature can be used to save data logger memory contents. RST Instruments personnel can recover some or all customer data from dump files, providing data is not corrupted and it was not overwritten. Only raw data in B units can be recovered from dump files. Select Memory Dump in Advanced Options to write entire memory contents into a disk file in data folder.



**NOTE:** The Memory Dump feature is included for emergency memory content retrieval. Under any circumstances, memory dump files should not be used for data collecting.



# 9.3 **STATUS MESSAGES**

The following table lists the status bar messages with descriptions.

#	Status Message	Description
1	Communication port open	Communication port is open
2	Unable to open communication port	Some other application is using this port
3	Connecting to the logger	DT Logger Host is trying to connect to the logger
4	Connection not established	DT Logger Host was unable to connect to the logger
5	Connection established to the logger	DT Logger Host was able to connect to the logger
6	Reading logger settings	All logger settings are copied to the DT Logger Host for display
7	Error during settings read	Error occurred during settings read
8	Idle	Idle time between status or data reads
9	New logger detected	Logger exchanged with another logger; DT Logger Host reset
10	Logger settings successfully read	All logger settings were successfully transferred to DT Logger Host
11	Error reading logger settings	Error occurred during reading logger settings
12	Connection Error	Connection attempts timed out
13	Reading logger memory	Logger memory contents is being copied to the DT Logger Host
14	Writing logger settings	All displayed settings are being transferred to the logger
15	Error during settings write	Error during settings write

#### Table 9-1 – Status messages

# **10 RST DATALOGGER USB DRIVER SET INSTALLATION**

The DT Logger Host software requires a set of drivers installed on the host computer in order to communicate over USB communication port. All steps must be completed for USB communication to work correctly.

The following outlines a procedure for installing the DT2055 Controller Driver Set on Microsoft<sup>™</sup> Windows 7, 8, 8.1 and Microsoft<sup>™</sup> Windows 10 platforms. Installation steps for DT2055B, DT2040, IC6656, DTL201B-2B, DT4205, DT2306, DT2350, GAA2820, DTSAA and DT2011B Loggers are the same. The actual screenshots may differ, but the steps will be very similar.

# 10.1 MICROSOFT<sup>™</sup> WINDOWS 7, 8,8.1,10 INSTALLATION PROCEDURE

After successful DT Logger Host Software installation, click on *Install USB Drivers* in *Tools* section of DT Logger Host program group. DT Logger Host group should reside under *RST Instruments* start menu by default. The following are the installation instructions for DT2055 logger. DT2055B, DT2040, IC6656, DTL201B-B, DT4205, DT2306, DT2350, GAA2820,



DTSAA, and DT2011B Loggers driver installation steps are very similar. The USB driver setup starts showing following dialog:



Figure 10-1 – New Hardware wizard for device

Click **Next** to proceed with the USB driver installation.



Figure 10-2 – New Hardware wizard for device – choose install

Select your acceptance of RST Instruments End User License Agreement, click Next.



Figure 10-3 – New Hardware wizard for device – install complete

After successful installation of USB to UART device drivers, the Multichannel Datalogger should be connected to the host computer. The MS Windows system should detect the new device and display the yellow message balloon in the lower right-hand corner stating that all device drivers are installed and ready to use.



Figure 10-4 – New Hardware wizard for controller – install complete

Open the Device Manager (located in "Control Panel\System", click "Device Manger") and expand "Ports" branch. The device appears as an "RST DT2055 Multichannel Logger" (Figure 10-5).





Figure 10-5 – Windows 7, 8, 8.1, 10 Device Manager

If the driver was installed correctly, the RST DT2055 Multichannel Readout port will appear as in Figure 10-5 above. If the driver has not been installed correctly, yellow exclamation mark will appear next to the device. Once the above has been verified, note the COM number which has been assigned to the USB serial port. This will vary from computer to computer, in this example it is COM3.

Close the device manager and launch the DT Logger Host Software. The DT Logger Host Software should now connect to the logger. Confirmation can be made by looking at the status bar (Figure 5-1).



# **11 SPECIFICATIONS**

Manufacturer	RST Instruments
Model	L900
Operating Frequency	866MHz, 900MHz, 2.4 GHz
Gain	5.5 DBi
Impedance	50 Ohm
VSVR	< 2.0
Weight, Length, Diameter	20 G, 208 mm, 13 mm
Connector	Reverse Polarity
Operating Temperature	-40 °C TO 85 °C
Flame Rating	UL94HB
Polarization	Vertical
RoHS Compliant	Yes
Radiation Pattern	Omnidirectional

# Table 11-1 – RST L900 Radio and Antenna Kit